(No Model.) 3 Sheets—Sheet 1.

E. ANTHONY.

PRINTING.

No. 273,431. Patented Mar. 6, 1883.

Fig. 1.

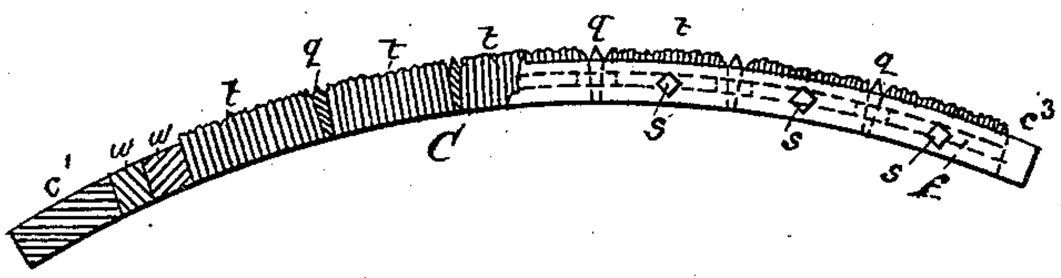


Fig. 2.

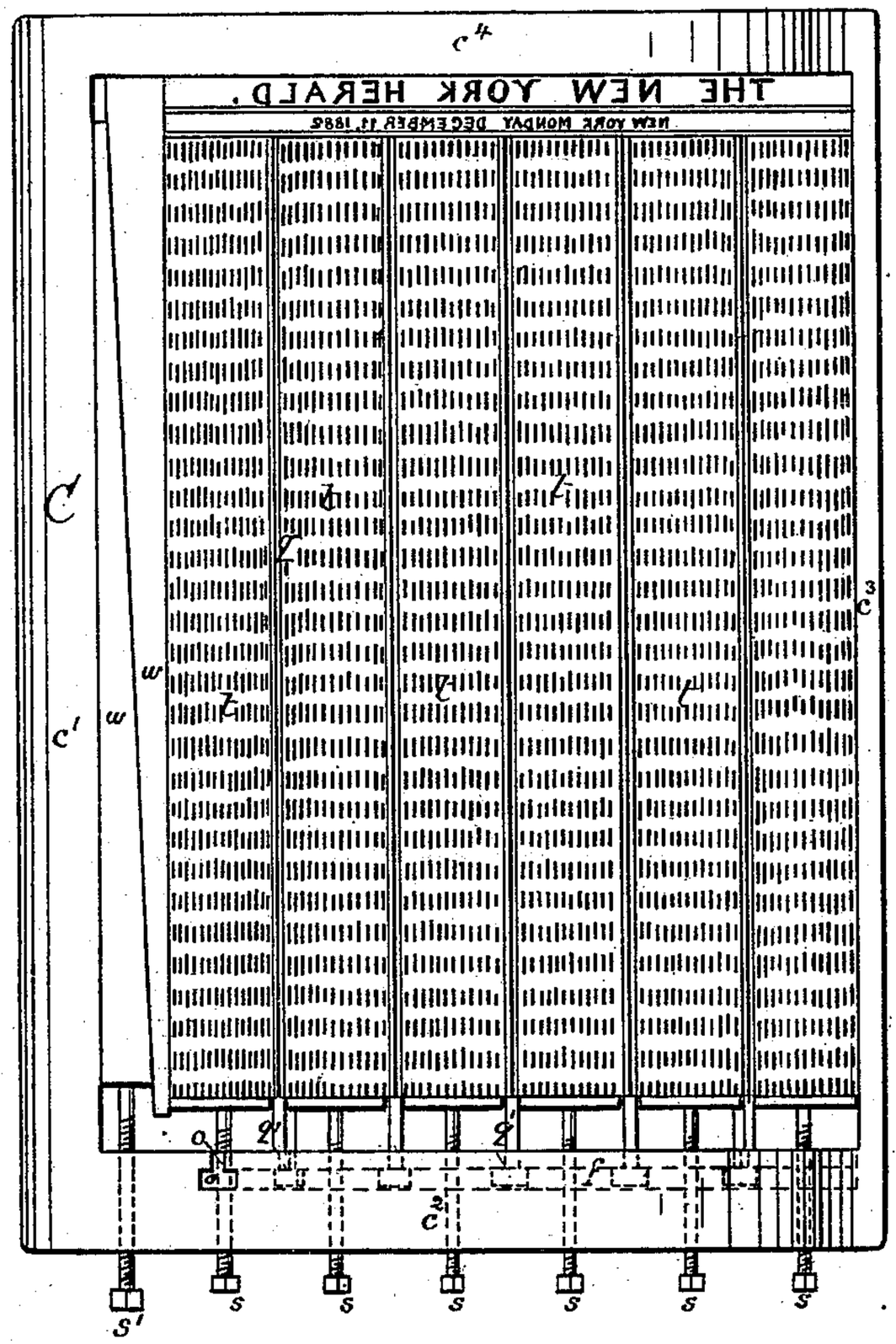
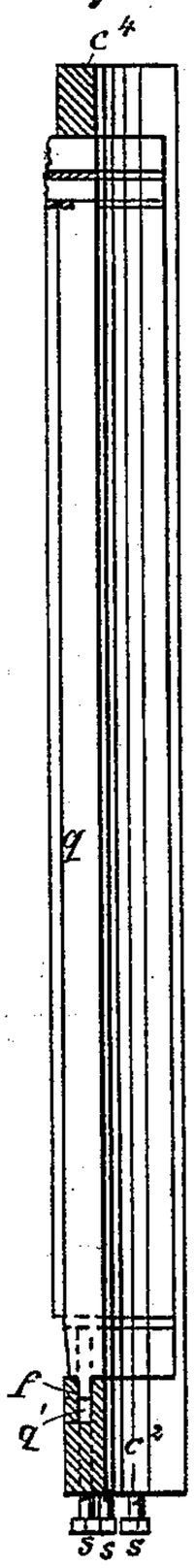


Fig. 3.



Witnesses.

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3 Sheets—Sheet 2.

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Fig. 7.

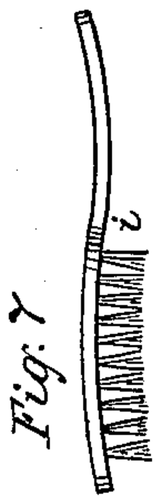


Fig. 5.

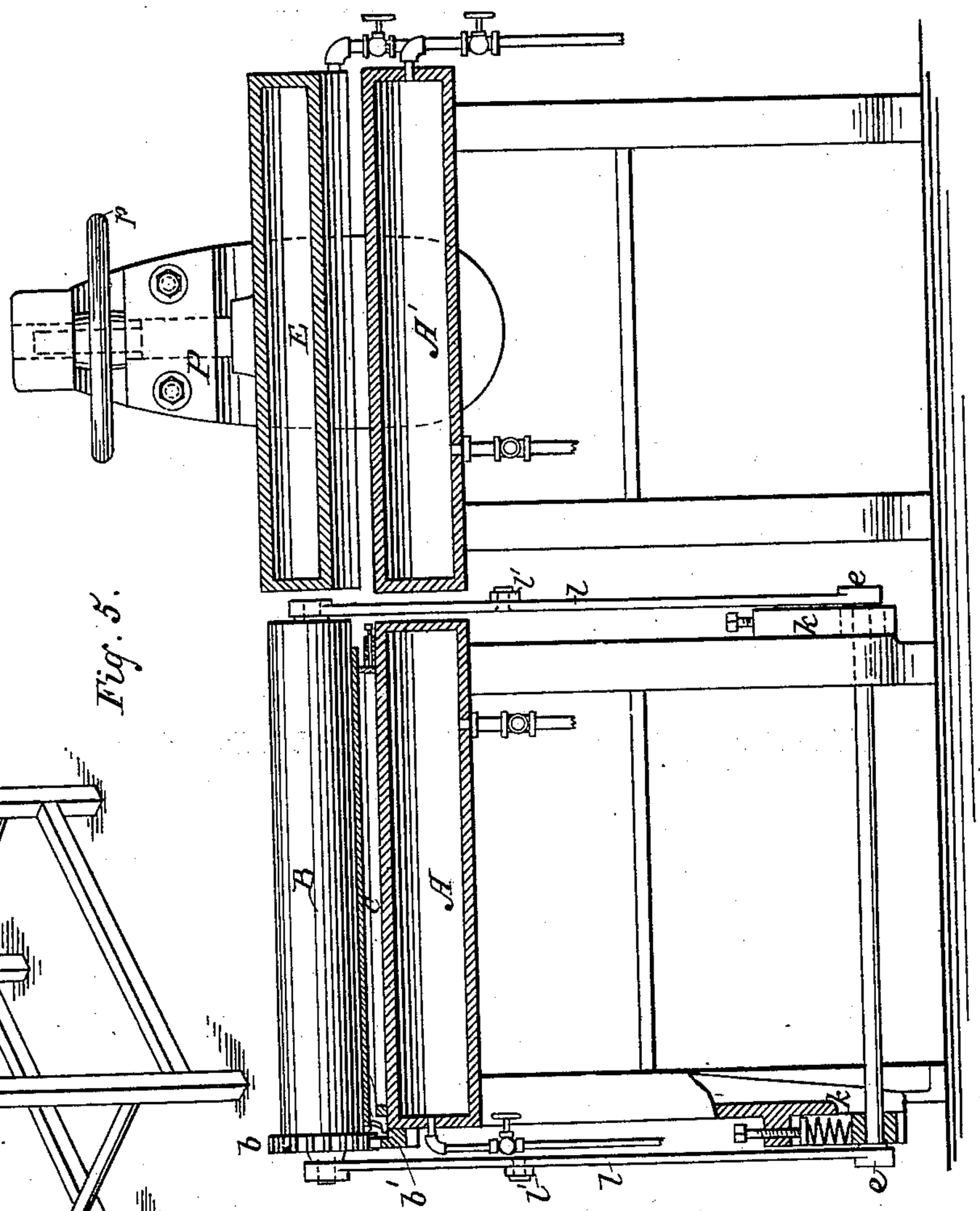


Fig. 6.

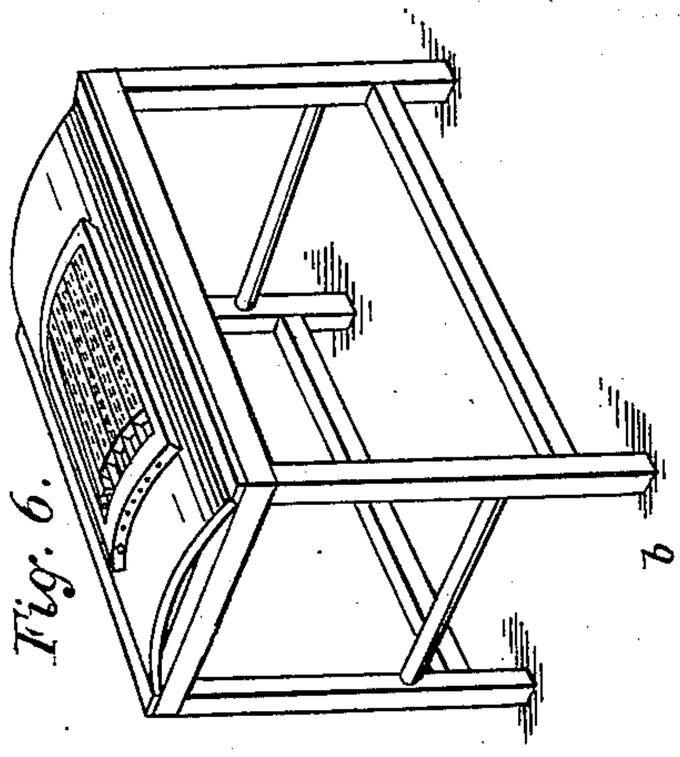
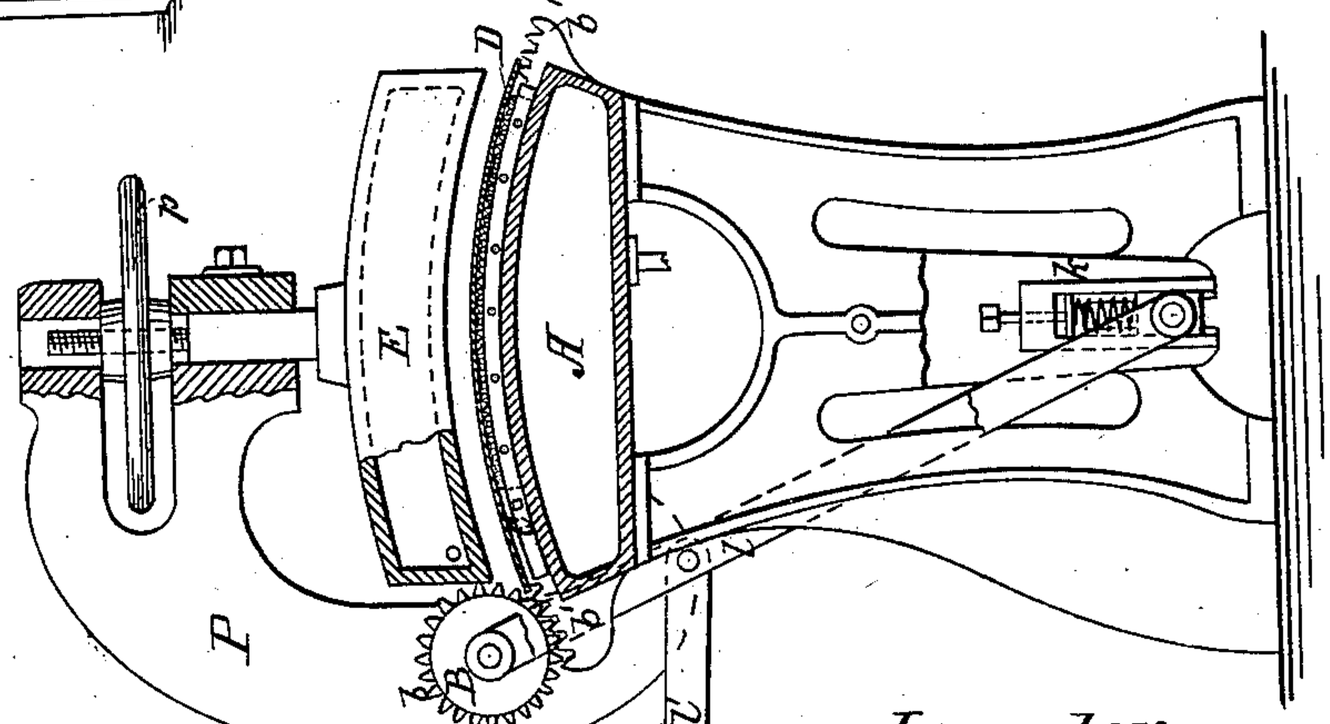


Fig. 4.



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3 Sheets—Sheet 3.

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PRINTING.

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Fig. 8.

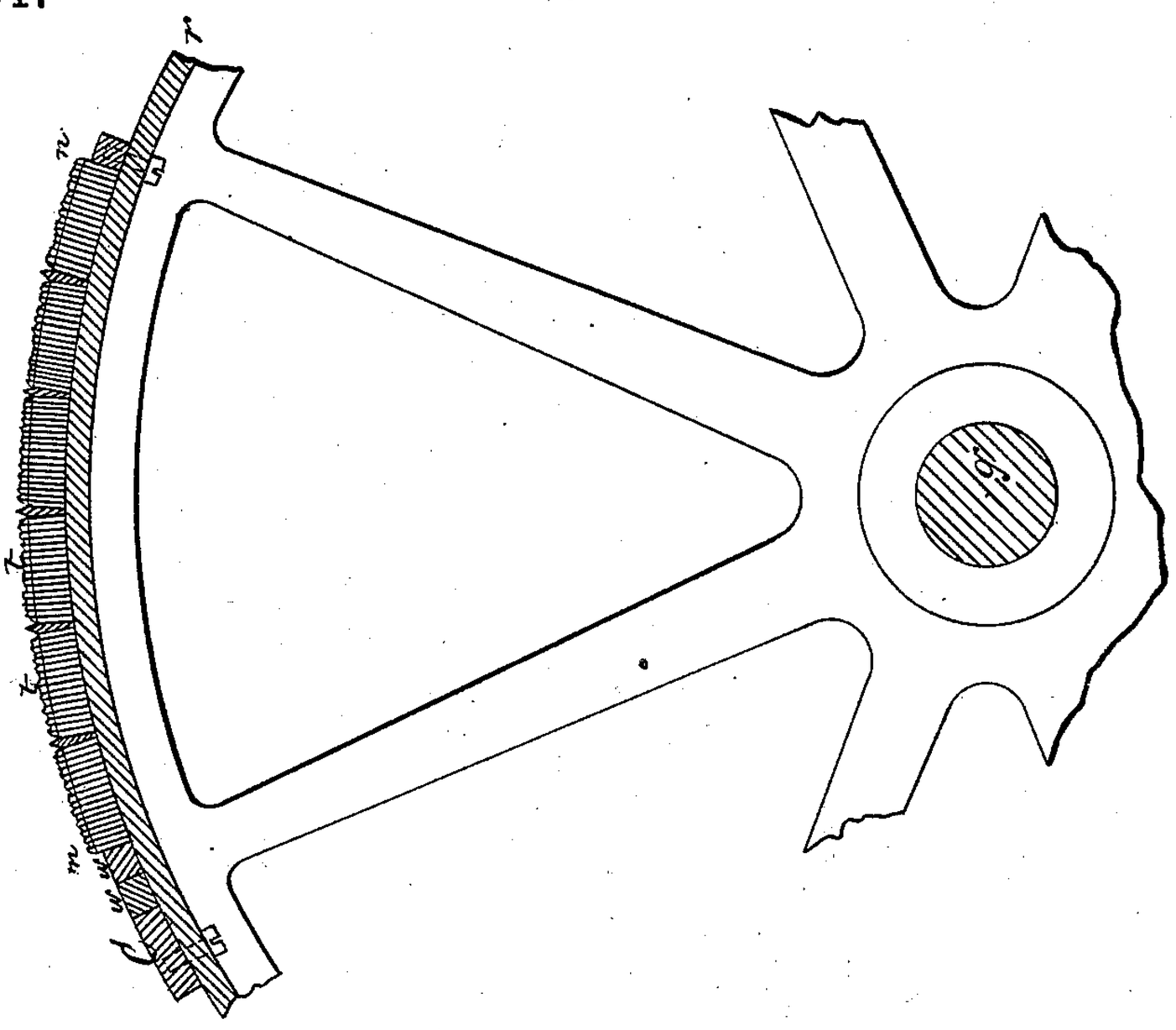
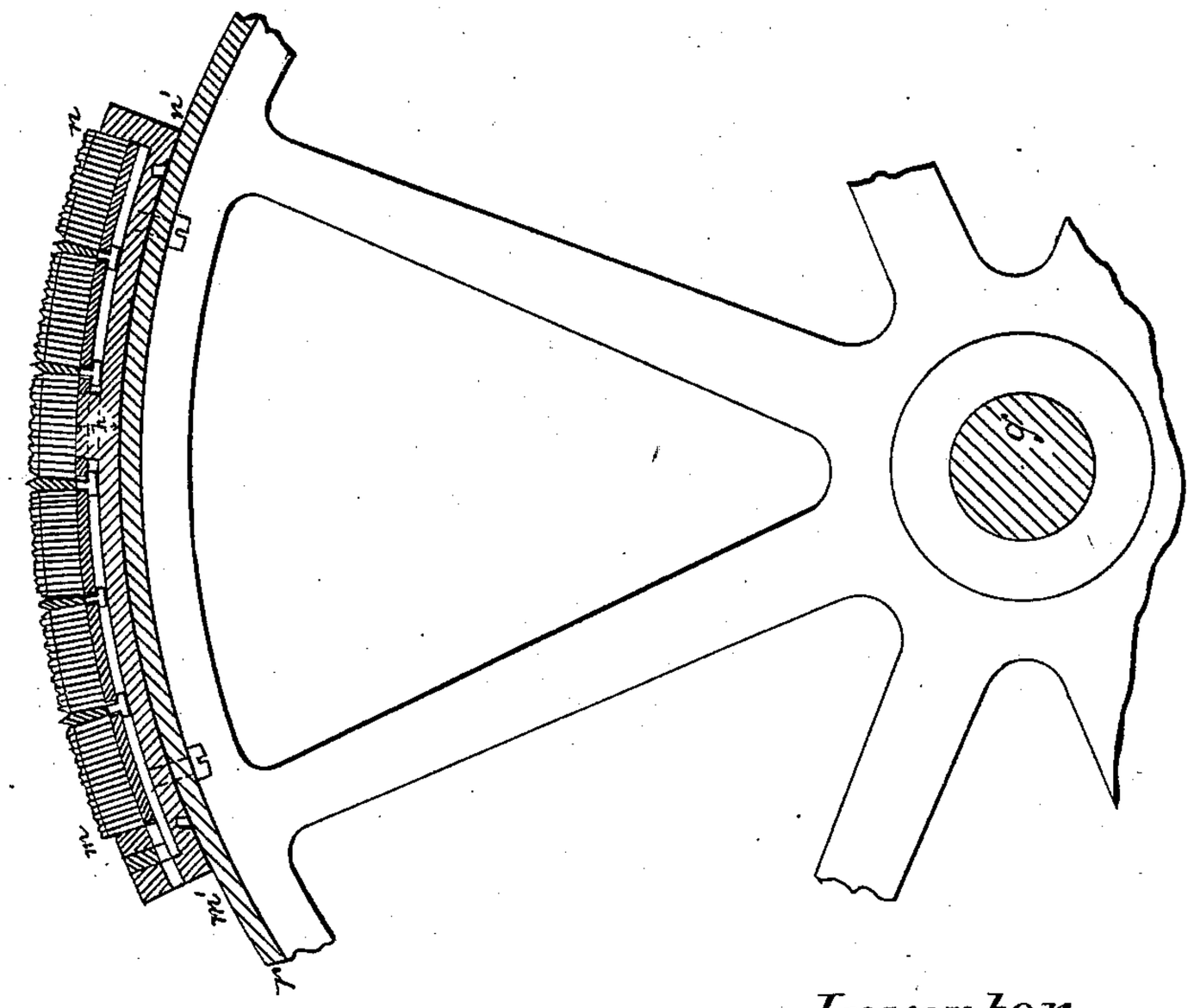


Fig. 9.



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Walter Maldron

Inventor:
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by Elec Sheean
Attorney

UNITED STATES PATENT OFFICE.

EDWYN ANTHONY, OF NEW YORK, N. Y.

PRINTING.

SPECIFICATION forming part of Letters Patent No. 273,431, dated March 6, 1883.

Application filed December 14, 1882. (No model.)

To all whom it may concern:

Be it known that I, EDWYN ANTHONY, a subject of the Queen of Great Britain, residing at New York, in the county and State of New York, have invented a new and useful improvement in printing from cylindrically-set type and stereotype taken from papier-maché matrices from the type set with such cylindrical surfaces, of which the following is a specification.

Heretofore the said matrices have been obtained from type fixed in flat chases resting on a plane, so that the surface of the type is a plane. Consequently, if it is afterward required to place the type on a rotary printing-press—*i. e.*, on one on which the type is put on one or more cylinders—it is necessary to take the type out of the said chases and rearrange it in movable type-beds. This operation consumes considerable time—in fact, as much as is required to produce several stereotype-plates. By my invention the just mentioned delay is avoided. On the removal of the matrix from the surface of the type it (the type) may be placed directly on the printing-cylinder, so that one machine may be printing from type before the stereotype-plate is cast, and when the latter is finished it can be placed on a second machine. Thus by the time one set of plates is ready two machines would be running, one printing from type and the other from stereotype, the former having been started just so long as it takes to produce a finished stereotype-plate from the papier-maché matrix. I am thus enabled, where the circulation is large enough to require the simultaneous use of two or more machines, to go to press considerably later than when the matrices are obtained from a flat surface. My invention is also useful where only one machine is used, but more than one edition is printed, for the pages in which alterations are to be made can be stereotyped and the plates put on the machine. The type will thus be free for the making of alterations while the first edition is being printed, and the next edition can be printed from the type thus altered. But had the matrices been taken from a flat surface it would be necessary, after obtaining the matrices, to remove the type into type-beds before it could be placed on the printing-cylinder, and even when stereotyping is not employed, the curved chase and the improved type-bed hereinafter described are more convenient than the type-beds heretofore used, on account of their less weight and consequent facility in handling.

Figure 1 is a cross-section partially in view of the curved chase hereinafter described. Fig. 2 is a plan view, and Fig. 3 a longitudinal section, of the same. Fig. 4 is a cross-section on the line *a b* of the rolling apparatus, showing behind the pressing apparatus. Fig. 5 is a longitudinal section of the rolling and pressing apparatus; Fig. 6, a perspective view of the curved imposing-table. Fig. 7 shows the shape of the brush. Fig. 8 is a section of a portion of a printing-cylinder with a curved chase on it, and Fig. 9 shows a section of a portion of a printing-cylinder with the curved movable type-bed thereon hereinafter described. Fig. 6 is the imposing-table with a curved chase on it filled with type.

The said table should be securely fastened on any strong suitable frame, and so that the height of the surface of the table may be convenient for the purpose of lifting the type in and out of the chases. The table itself should be of iron, and the form of its upper surface should be accurately that of a portion of a cylinder of the same curvature as the printing-cylinder. The curvature of this last cylinder will of course depend upon the amount of curvature which it is desired the surface of the type should have. This being fixed, the diameter of the printing-cylinder (and of the upper surface of the imposing-table) will be less than the diameter of the cylinder of which the upper surface of the type forms part by twice the height of the type. When, in lieu of the chases, the hereinafter-described movable type-beds are employed, the imposing-table is not required, and the diameter of the printing-cylinder will be less than it was in the previous case by twice the thickness of the lower parts of the said movable type-beds. My invention is applicable whatever kind of rotary printing-press be used, and no alteration therein is required, except in the printing cylinder or cylinders, as the case may be.

The movable type-beds of the usual construction really form a portion of the printing-cylinder and receive the pressure which the type undergoes in the act of printing. In my case the irremovable parts of the cylinder must be able to resist this pressure, and therefore the surface of the said printing-cylinder, or, rather, of that portion of it on which the chases or the hereinafter-described movable type-beds rest, should be continuous—that is to say, it should be a smooth cylindrical surface similar to that of a cylinder intended to receive stereotype-plates, and of course it must be accurately made, inasmuch as when the curved chases are used it forms the bed on which the type rests, similarly to the case of flat-surface printing. For example, Fig. 8 shows a portion of a printing-cylinder with a curved chase fastened thereon. Considerations outside this invention determine the curvature of the surface *m n* of the type, the fraction the arc *m n* is of the whole circumference, and the number of printing-cylinders used. All that need be considered is that *r*, Fig. 8, must be a continuous plate of metal of sufficient thickness, and that its upper surface must be accurately that of a cylinder whose axis is *g*, and radius less by the height of the type than that of which the upper surface, *m n*, of the type forms part. When, instead of the chases, the curved movable type-beds are used, then (Fig. 9) the printing-cylinder will be as before, except that the radius of the upper surface of *r* will be less by the height of the type plus the thickness *h* of the type-bed than that of the cylinder of whose surface the upper surface, *m n*, of the type forms part.

I will now more particularly describe the curved chase C, which is shown separately in Figs. 1, 2, and 3. c' c^2 c^3 c^4 form its four sides. c' and c^3 are straight in the direction of their length, while c^2 and c^4 are curved. The under surface of the chase should be a portion of a cylinder whose axis is parallel to c' or c^3, and whose radius equals that formed by the upper surface of the imposing-table, Fig. 6. Thus its under surface will rest in contact with the surface of the imposing-table just as a flat chase does on the surface of a flat table. The thickness of the chase should be a little less than the height of the type, but only sufficiently so to prevent the chase from blackening the paper in its passage through the machine. The sides c' c^2 should be some two inches or more broad for strength's sake. The breadth of c^3 and c^4 will be limited by considerations of margin, (if a chase is to be placed on the machine to the right of c^3 and one above c^4,) as any one skilled in the art will readily understand without further explanation. The rules *q* are of similar shape to those used in the ordinary movable type-beds; but they lack their bottom projecting pieces—that is to say, their sides, Fig. 1, are inclined to one another, so that the sides facing one another of any two consecutive rules are approximately parallel. The height of the rules is the same as that of the type *t*. At one end the rule has a T-shaped prolongation, *q'*, Figs. 2 and 3, which can be inserted in the recess *o*, Fig. 2, and which is made to slide in the groove *f* cut for the purpose out of the side c^2 of the chase. This groove should follow the curve of the chase, so that the bottoms of the column-rules are always in contact with the surface of the imposing-table, and of course of the printing-cylinder when on the machine. The purpose of the prolongation and groove is to keep the rules upright when the chase is empty or in course of being filled. The other ends of the rules may be secured to the chase by any convenient or well-known means. The type *t* may be secured in the chase in any suitable way. The means used in an ordinary movable type-bed, for instance, may be adopted.

s s' are screws which pass through the side c^2 of the chase. The turning of the screw *s'* causes the triangular pieces *w w* to slide upon one another, and thus produces pressure against the sides c' c^3 of the chase, while the turning of the screws *s s*, &c., causes the respective columns of type to press against the sides c^2 c^4 of the chase. The type having been thus locked up and its surface planed in the usual way, the chase C, with the type in it, is removed and fastened on the rolling apparatus, Figs. 4 and 5. The surface of the bed A of the rolling apparatus is cylindrical and of the same curvature as the surface of the imposing-table, and it is heated by steam or in any other suitable way. The various layers of paper, &c., which make up the papier-maché matrix, having been put one over the other on the type, similarly to what is done when the surface is flat, the matrix is formed by passing the cylinder B over it and back again, thus causing the papier-maché D to receive an impression of the type. The motion of B may be produced in any suitable way. For example, the to-and-fro motion of its axis may be effected by the arms *l l'*, *l'* receiving its motion from a crank and *l* oscillating round the axis *e*. The rotation of the cylinder B round its own axis may be caused by a cog-wheel, *b*, and curved rack *b'*, the pressure it exerts on the matrix being regulated by the adjusting device K. After the matrix has been thus formed it may be beaten in any places that may require it, just as is done in the usual flat process. It is, however, convenient to use for this purpose a brush whose surface is of the same shape as is the surface of the type, like the brush *i*, Fig. 7. If preferred, the matrix may be entirely formed by beating the papier-maché with brushes such as described, and without rolling it. After the matrix is completed the chase C is unfastened from the surface of A, and without being lifted it may be pushed along until it is on the bed A' of the drying-press. The surface of A' is of course of precisely the same shape as that of A. In fact, they would form one continuous surface except for the small in-

terval necessary for the passage between them of one of the arms, *l*. By causing the motion of the cylinder B to be otherwise communicated A and A′ might be made with no interval between them and form one continuous bed. The follower E, which is supported by and guided in the frame P, is now brought down on the matrix by turning the wheel *p*. The said follower E is heated by steam or by other suitable means, and its under surface is cylindrical, its radius being very slightly greater than that of the cylinder formed by the surface *m n* of the type, in order to allow for the thickness of the matrix, &c. As soon as the matrix becomes dry the follower E is raised and the matrix removed from the surface of the type. It may now be placed (just as when taken from a flat surface) in a mold of any desired curvature and stereotype-plates of any shape required obtained from it in the usual way. Indeed, a matrix obtained from a cylindrical surface in the manner hereinbefore explained is for all practical purposes the same as one obtained from a flat surface. On account of the greater expansibility of type metal than of iron or steel under the action of heat it will be well not to lock up the type too tightly, and to further tighten it after the matrix is taken, but before beginning to print.

In some cases—when, for instance, a page is of unusual breadth or occupies an unusually-large arc of the circumference of the printing-cylinder—it will be better to use the movable type-beds shown in Fig. 9, instead of the curved chase.

The column-rules, locking-up devices, &c., may all be constructed as in the well-known type-beds at present in use; but its under surface cannot be so made. The said under surface, *m′ n′*, Fig. 9, must be a continuous portion of a cylinder, and the thickness of the bed *h* must be as small as conveniently can be. Nor need this thickness be great, because the pressure caused by printing will be transmitted to the surface *r* of the hereinbefore-described printing-cylinder, which surface may be made as strong as desired, since the thickness of *r* may be taken at pleasure. What are called the "movable type-bed" (shown in Fig. 9) are therefore substantially curved chases with a thin bottom. The disadvantage of this movable type-bed as compared with the curved chase is that it is heavier and the matrix takes longer to dry. The rolling apparatus and the drying-press, &c., will be just the same as when curved chases are used, except that the radius of the upper surface of A and A′ must be less than the radius of the upper surface of the type by the height of the type plus the thickness of *h*, Fig. 9.

In the drawings I have shown A A′ and E hollow and heated by steam-pipes; but since I do not claim any particular mode of heating, and the way indicated is well known in the ordinary flat process, it is unnecessary to more particularly describe them. A similar remark applies to many other details.

What I herein claim as my invention is—

An improvement in the art of printing on cylindrical surfaces, consisting in first making up the type-form on a chase or form curved to fit the cylinder of the printing-press, and adapted to the rapid drying of the matrix, in making from said curved form a matrix and drying it in contact with the form, in casting a stereotype-plate from said matrix, and finally in using both the type-form and the stereotype in printing, substantially as described.

EDWYN ANTHONY.

Witnesses:

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CHAS. RAETTIG.