B. F. UPHAM.

METHOD OF BENDING PRINTING SURFACES.

APPLICATION FILED JAN. 15, 1908.

903,342.

Patented Nov. 10, 1908.

2 SHEETS—SHEET 1.

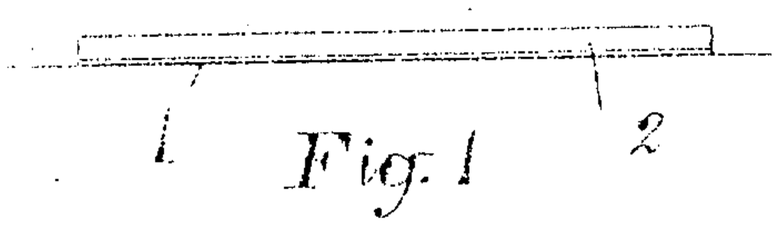


Fig. 1

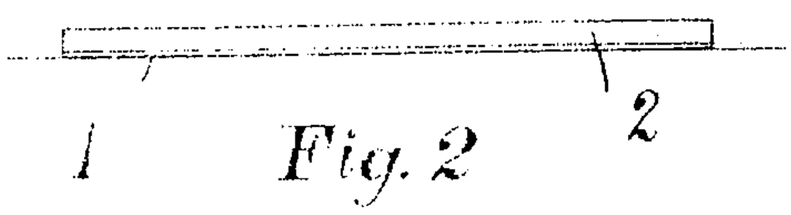


Fig. 2

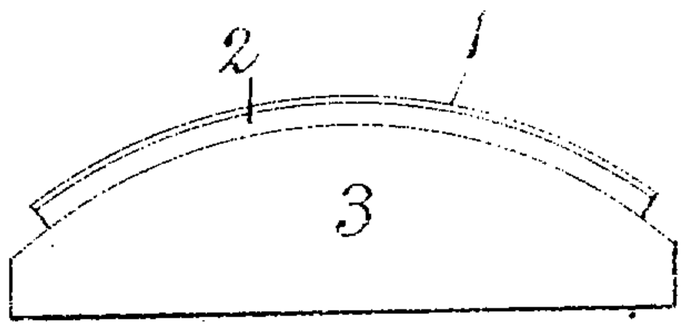


Fig. 3

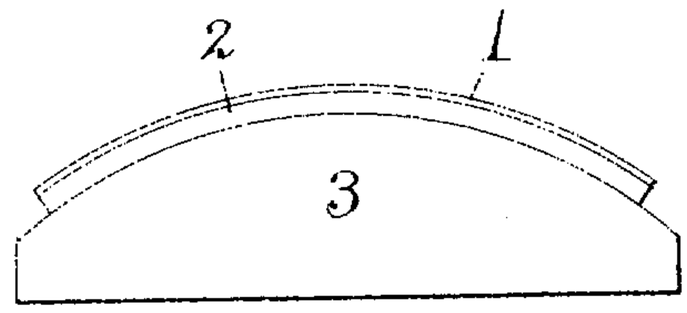


Fig. 4

Fig. 5

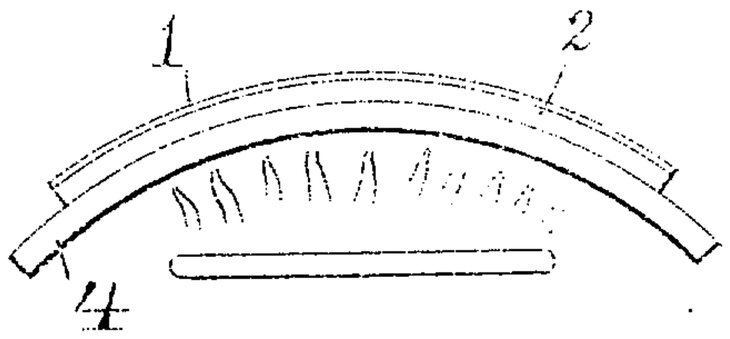
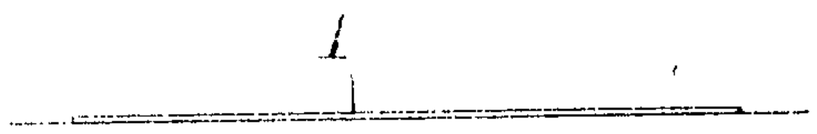


Fig. 6



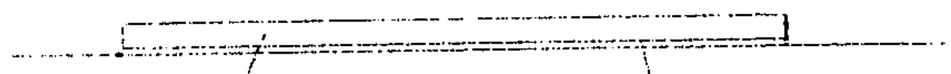


Fig. 7

Witnesses;

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2 SHEETS—SHEET 2.

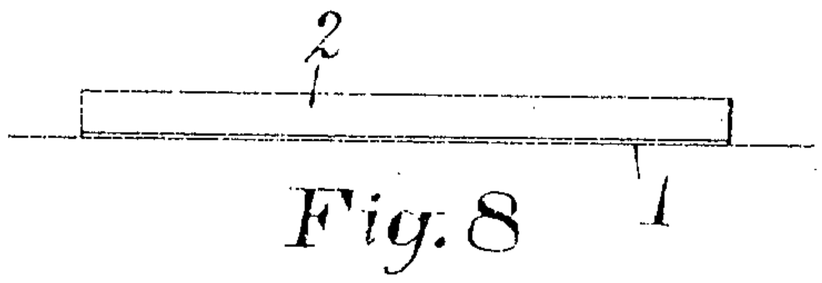

Fig. 8

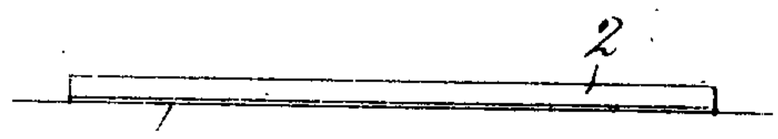

Fig. 9

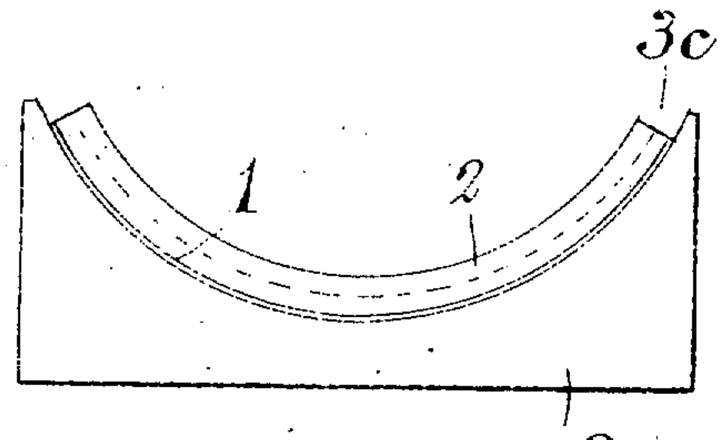

Fig. 10

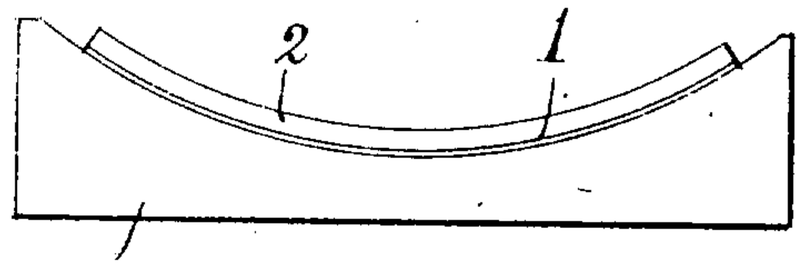

Fig. 11

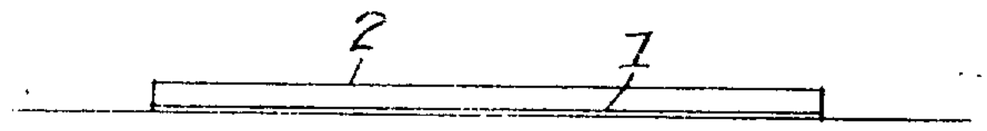

Fig. 12

Witnesses;
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By A. B. Upham
Attorney.

UNITED STATES PATENT OFFICE.

BURT F. UPHAM, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO SOUTHGATE MACHINERY CO., OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

METHOD OF BENDING PRINTING-SURFACES.

No. 903,342. Specification of Letters Patent. Patented Nov. 10, 1908.

Application filed January 15, 1908. Serial No. 410,895.

To all whom it may concern:

Be it known that I, BURT F. UPHAM, a citizen of the United States, and a resident of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Methods of Bending Printing-Surfaces, of which the following is a full, clear, and exact description.

One of the great obstacles to the use of a two-color press employing both flat and cylindrical printing surfaces has been the practical impossibility of making such surfaces register. In a companion application of mine, Serial No. 409,805, I have disclosed methods whereby this can be accomplished in such a manner as to bring the curved plate into exact register with its flat original; the process being such that all superficial distortion caused by bending the curved plate is finally eliminated.

In the present application, I set forth a method whereby I permit the curved plate to remain superficially elongated, and provide means for equally elongating the flat plate, so that the two will perfectly register, though not with their original.

Referring to the drawings forming part of this specification, Figure 1 represents an electrotype shell after it has been backed up flat in the usual manner. Fig. 2 is a second plate similarly backed. Figs. 3 and 4 represent the same plates each curved to fit the cylinder upon which one of them is to be used. Fig. 5 illustrates one of the plates having its backing melted off. Fig. 6 shows the electrotype shell after having its backing thus removed, and then flattened; and Fig. 7 illustrates this shell again backed up flat. Figs. 8–12 show steps in my modified process.

In order to bring the two plates to an exact correspondence, the duplicate electrotype shells are both laid flat and backed up by pouring melted metal thereon to an excessive thickness, and then planing the latter down to gage, in accordance with present practice; Figs. 1 and 2 illustrating the two plates thus formed, and the reference numerals 1 and 2 designating the shells and backing, respectively. Both plates are then placed face outward upon a suitable convex surface 3 of the curvature of the cylinder upon which one thereof is to be used, and made to accurately conform thereto. This elongates the printing surface of each to a substantial extent; the distortion amounting to one-eighth of an inch in a medium sized plate. This completes the process for one plate, but the other is heated until practically all its backing has been melted off, as by placing it upon the heated curved surface 4 shown in Fig. 5, or otherwise. The electrotype shell thus denuded of backing, and still in its elongated condition, is then flattened without affecting such distortion, as indicated in Fig. 6, and finally backed up flat in the usual way, as illustrated in Fig. 7. The resultant flat plate being thus made to retain all the superficial elongation of its curved companion, will accurately register therewith, and both can be simultaneously employed upon a press having both a curved and a flat printing surface. The type of press for which this process is particularly valuable is the two-color press set forth in my companion application Serial No. 417,000; but there are other applications thereof which are almost equally useful.

Although I have described this process as employed for electrotype shells, it is also applicable to other printing surfaces, as photo-engraved plates, and the like. Further, the process can be carried out, though in a less perfect manner, by mounting the printing surfaces upon a form of backing other than the fusible backing described, and detaching one of the same from its backing prior to flattening it. It is possible, also, to so soften a backing, as by heat applied to a metallic one, or moisture to an organic composition, that the curved printing surface can be flattened without affecting its acquired elongation.

Although this method of bending printing surfaces is not so perfect a one theoretically as that described in my said companion application Serial No. 409,805; yet it is in some respects similar and more easily performed in the usual printing offices.

I have described this process as applicable to the exact registering of flat and curved printing surfaces, but it is evident that it can also be used for presses having a plurality of cylindrical printing surfaces of differing diameters. Hence when I use the expression in the claims, of "dissimilarly contoured printing surfaces," I design to embrace therein any such unequal cylinders as well as a flat and a cylindrical printing surface.

Although I have described the two plates as being bent to exactly the same curve, I find that when the backing is melted from the one to be flattened, the electrotype shell thus unbacked is released from a condition of slight resilient strain, and hence recovers the merest fraction of its elongation. Consequently, I prefer to bend such plate upon a form 3 of slightly less radius than the form upon which the other plate is bent. The difference is so small, however, that I call their curvature equal.

In the modification of my process for thus equalizing the superficial distortion of a plurality of unequally curved plates, the same results can be accomplished by backing up one of the two plates to double the thickness given to the other; bending the extra heavy plate on a cylinder of half the radius of the other's cylinder; routing or turning off this extra heavy backing to the same gage as the other, and then flattening it. The double amount of bend given to the heavy plate, causes a double elongation of its printing surface as compared with the other, which is halved by its final flattening after the excess of backing has been removed. This process is carried out by the steps represented in Figs. 8 to 12 of the drawings; Fig. 8 showing an electrotype shell 1 backed up to approximately double thickness as compared with the shell 1 in Fig. 9. The two backed plates are then bent in the concave molds 3^a, 3^b, or upon convex forms 3 as shown in Fig. 4; the important point being that the curvature of the mold 3^a shall be substantially sharper than that of the other mold. Where the plates are being prepared for a press with a flat bed, the difference in radius should be about one half, but where the two plates are for a press having two cylindrical printing surfaces of different radius, the proportion will not be the same. The heavy backing is then routed off to the dotted line 3^c shown in Fig. 10, to bring the plate to the same thickness as the other plate in the mold 3^b shown in Fig. 11. The formerly heavy plate is now flattened, as indicated in Fig. 12, and the excessive distortion given thereto by its first bending is sufficiently counteracted to bring the two printing surfaces to an equality in elongation, and a consequent perfection in register.

What I claim as my invention and for which I desire Letters Patent is as follows, to wit;—

1. The herein described method of bringing two dissimilarly contoured printing surfaces into register, which consists in similarly and equally bending the two properly backed surfaces, and then changing one thereof to its desired contour without affecting its superficial distortion.

2. The herein described method of bringing two dissimilarly contoured printing surfaces into register, which consists in similarly and equally bending the two backed surfaces, then removing the backing from one thereof, changing it to its desired contour, and finally rebacking it.

3. The herein described method of bringing two dissimilarly contoured printing surfaces into register, which consists in similarly bending the two backed surfaces, applying heat to the backing of one in order that it can be bent to its desired contour without affecting its superficial distortion, and then so bending it.

4. The herein described method of bringing two dissimilarly contoured printing surfaces into register, which consists in similarly bending the two surfaces backed with a fusible metal, melting the backing from one surface, flattening it, and finally rebacking it.

5. The herein described method of bringing a flat and a curved electrotype plate into exact register, which consists in providing the two electrotype shells with a fusible backing in the usual manner, similarly and equally bending both, melting the backing from one thereof, flattening this unbacked shell, and finally rebacking it.

6. The herein described method of bringing a flat and a curved electrotype plate into register, which consists in backing up two flat electrotype shells, bending both, and returning one to a flat condition; between the latter's curving and flattening its backing being so treated that its superficial elongation shall exactly equal that of the curved plate.

In testimony that I claim the foregoing invention, I have hereunto set my hand this 13th day of January, 1908.

BURT F. UPHAM.

Witnesses:
A. B. UPHAM,
M. C. GATES.