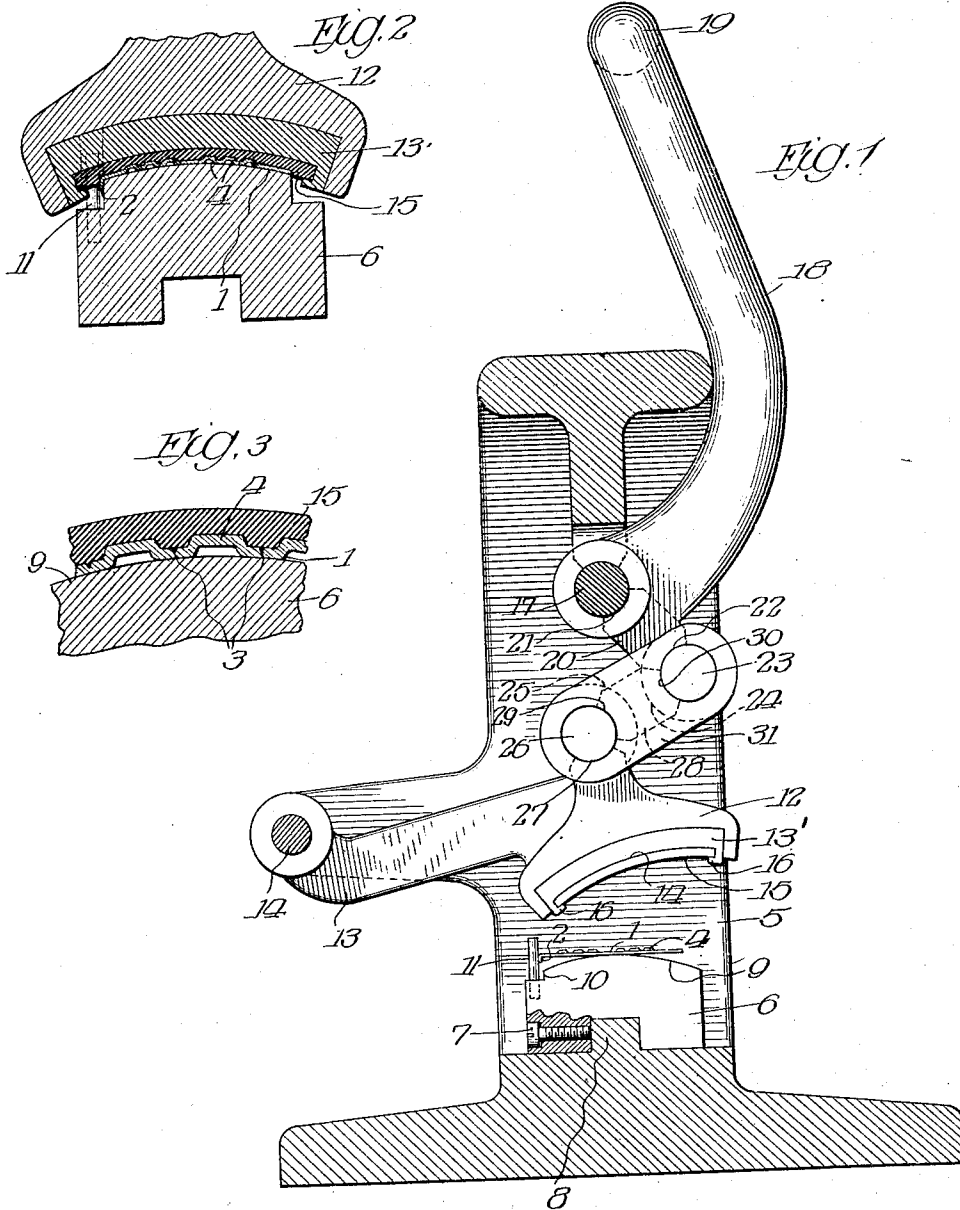


H. E. HUBBARD.
MACHINE FOR CURVING PRINTING PLATES.
APPLICATION FILED MAR. 8, 1915.

Patented Aug. 20, 1918.
2 SHEETS—SHEET 1.

1,276,532.



Witnesses:

W. E. Barrett

Ernest H. Merchant

Inventor

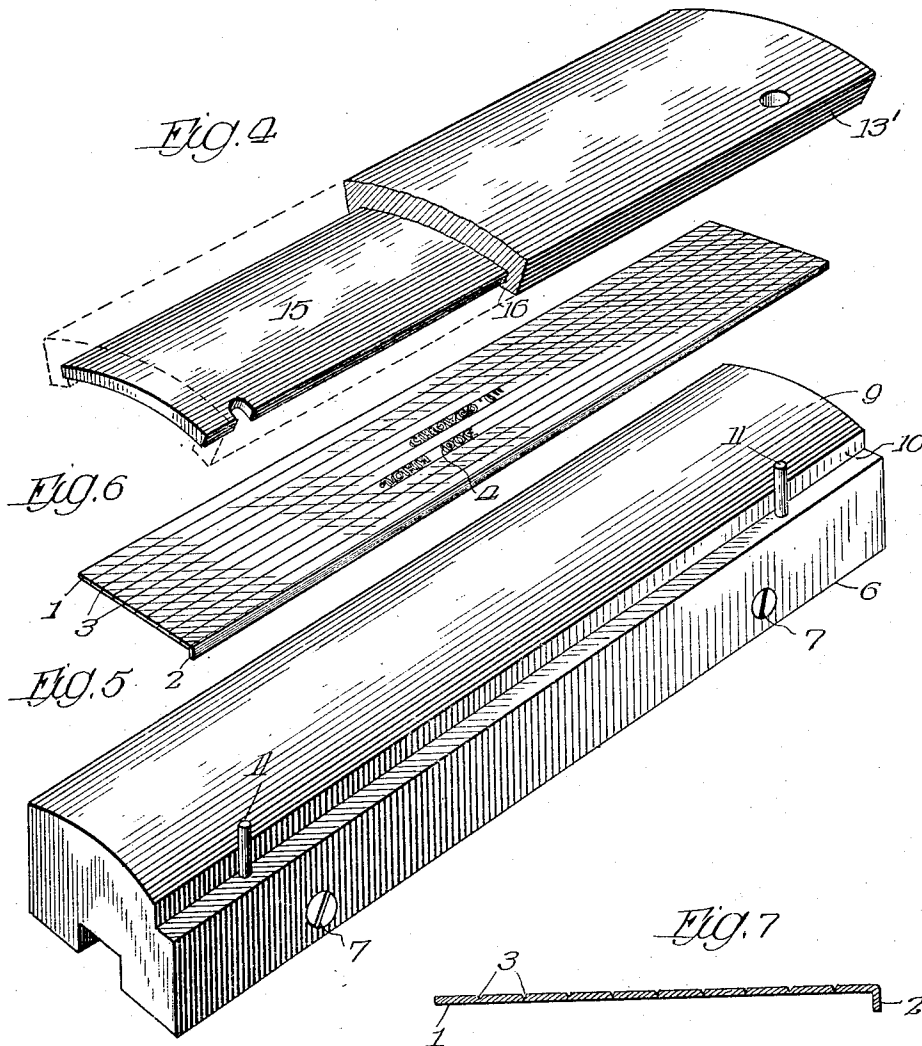
Henry E. Hubbard

By *Wm. F. Bell* Attorney

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[Signature]

Emmet H. Merchant.

Inventor:

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By *[Signature]*
Att'y.

UNITED STATES PATENT OFFICE.

HENRY E. HUBBARD, OF OAK PARK, ILLINOIS, ASSIGNOR TO ADDRESSOGRAPH COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MACHINE FOR CURVING PRINTING-PLATES.

1,276,532.

Specification of Letters Patent.

Patented Aug. 20, 1918.

Application filed March 8, 1915. Serial No. 12,817.

To all whom it may concern:

Be it known that I, HENRY E. HUBBARD, a citizen of the United States, residing at Oak Park, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Curving Printing-Plates, of which the following is a specification.

This invention relates to a machine for curving sheet metal printing plates.

An object of my invention is the provision of a machine of light and simple construction, easily operated and powerful enough to properly curve printing plates in a single operation.

Other objects and advantages of my invention will be apparent as it is better understood by reference to the following specification when read in connection with the accompanying drawing in which—

Figure 1 is a vertical section through the machine for curving the printing plates showing a printing plate upon the bed previous to the curving operation;

Fig. 2 is an enlarged detail in section of the bed and head of the machine with a printing plate disposed therebetween at the close of the curving operation;

Fig. 3 is an enlarged detail in section showing the cooperation between the printing plate and the resilient facing upon the head during the curving operation;

Fig. 4 is a detail in perspective of a portion of the head structure showing the arrangement of the resilient material;

Fig. 5 is a detail in perspective of the bed of the machine;

Fig. 6 is a detail in perspective of a printing plate according to my invention previous to the curving operation, and

Fig. 7 is a sectional view of the blank adapted for use in making curved printing plates.

The use of printing plates having characters struck up from the body of a sheet metal blank has been a recent development of the printing art. Methods and means for striking up printing characters from sheet metal plates have now been perfected and are in commercial use. The "Graphotype" is an example of a machine adapted for use in preparing such plates and reference may be made to the patent to Duncan No. 955,116, dated April 12, 1910, which illustrates one type of such a machine. Inasmuch as print-

ing machines having cylindrical beds are among the most efficient known it is desirable that methods and means be devised for preparing curved printing plates of the character described, adapted to be mounted upon the cylindrical beds of printing machines. Considerable difficulty has been experienced in producing a satisfactory curved printing plate for the reason that it is desirable to strike up the printing characters before the plate is curved, and during the curving operation the characters are liable to distortion. A further difficulty has been experienced in bending the plate to the desired curvature in a single operation, and applicant has devised the present means to overcome the various difficulties encountered.

Referring to Figs. 6 and 7 of the drawings, 1 indicates generally a blank particularly adapted for use in preparing curved sheet metal printing plates. This blank comprises a sheet of any suitable metal of desired form. A flange 2 is formed at one side thereof longitudinally of the plate and is adapted to cooperate with a portion of the curving machine to properly align the plate during the curving operation. The sheet is prepared by scoring the surface thereof along a plurality of parallel lines longitudinally of the plate. The plate is then placed in a suitable machine, such as the "Graphotype," which need not be here described, and lines of printing characters 4 are struck up from the scored surface of the plate, as indicated in Fig. 6, between the lines of scoring. It is to be understood that the characters shown in Fig. 6 are merely illustrative and that normally the surface of the plate between the lines of scoring will be more or less filled with printing characters.

When the above operations have been completed the flat printing plate is ready for the curving operation, which may be carried out in a machine presently to be described, which is particularly adapted for the purpose, or in any other suitable machine. Referring to Figs. 1 to 5 of the drawings, 5 indicates a frame of suitable construction adapted to rigidly support a bed 6, which may be held in position thereon by bolts 7 engaging an upwardly extending rib 8 on the lower portion of the frame 5. The bed 6 is provided with a convexly curved face 9 of a width substantially equal to or

greater than the width of the printing plate to be treated and having along one side an abutment 10 adapted to be engaged by the flange 2 of the printing plate 1. A pair of pins 11 are mounted in the bed 6 adjacent the abutment 10 and are adapted to cooperate with the flange 2 of the printing plate 1 to further aid in properly aligning the printing plate upon the bed.

10 A presser head 12, preferably formed integral with a pair of arms 13, is pivoted to the frame on the shaft 14 so that the head, which is normally disposed in inoperative position above the bed 6, may be lowered into operative relation with the bed, as shown in Fig. 2. Both the bed and the head are made sufficiently long to operate upon a printing plate throughout its entire length. The head 12 carries a member 13' having a face 14 curved to conform to the curvature of the face 9 of the bed 6. A facing 15 of yielding or resilient material, such as rubber, is mounted on the face 14 of the member 13' and preferably held in proper relation therewith by the flanges 16 integral with said member. The facing 15 may be readily sprung into position between the flanges 16 and will be retained thereby.

A shaft 17, mounted in the frame above the bed, carries an operating device in the form of a bell-crank lever comprising the upwardly extending arms 18 connected by a handle or grip-rod 19 and a downwardly projecting arm 20 extending substantially throughout the length of the machine. The arm 20 is curved at its upper end to provide a segmental bearing surface 21 adapted to bear against the shaft 17 and at its lower end to provide a similar segmental surface 22 adapted to press against the pin or shaft 23 rotatably carried by the arm 20 and sustained by suitable eyes or bearings 24. The member 12 is provided at its ends with similar eyes or bearings 25 to receive a pin or shaft 26 and is also provided with a segmental bearing surface 27 adapted to bear against the shaft 26. A bearing block 28, formed to provide segmental bearing surfaces 29 and 30 is interposed between the shafts 23 and 26 to impart thrust exerted by the shaft 23 to the shaft 26 and the shafts are prevented from separation and the block is held in place by links 31 surrounding the ends of the shafts 23 and 26. The arm 20, therefore, in conjunction with the shaft 23 and the block 28, affords a toggle connection between the operating lever and the pressure head so that when the arms 18 are swung downwardly to the right, viewing Fig. 1, the toggle will be straightened out and the head 12, carrying the yielding or resilient facing 15, will be forced into cooperative relation with the bed 6 to press the interposed printing plate into the shape shown in Fig. 2. The operating mechanism just de-

scribed is substantially identical with that disclosed in the patent to Duncan No. 1,111,143, September 22, 1914.

It will be manifest that since the presser head is pivotally mounted and all of the thrust of the operating mechanism is assumed by the segmental bearings between the shafts 17, 23 and 26, the friction between the operating parts will be very slight and the machine, therefore, will be very easy to operate. By adjusting the mechanism so that the toggle will be fully straightened when the desired pressure is exerted by the presser head, it will be obvious that a uniform pressure will be secured at each operation, consequently each plate operated upon will be curved to the same extent.

It will be noted from an inspection of Figs. 2 and 3 that during the pressing operation the printing plate is rigidly supported with its underside cooperating with the curved face 9 of the bed 6. The yielding or resilient facing 15 engages the printing surface of the plate and passes downwardly between the lines of printing characters so that the pressure is exerted evenly over the entire surface of the printing plate. I find that this yielding or resilient facing is essential to the efficient operation of a machine for curving printing plates and that by the use of this yielding or resilient facing I am enabled to produce not only a more perfectly curved plate, but the operation of the machine is much more rapid than has heretofore been possible. A machine provided with the yielding or resilient facing used in connection with printing plates scored as previously described results in the rapid production of plates perfectly bent to the desired curvature without distortion of the printing characters and with a minimum of effort. The bending of the metal occurs along the lines of scoring. The printing faces of the characters are, therefore, left flat and each face is disposed tangentially to an arc concentric with the center of curvature of the plate and clear and distinct impressions will, therefore, be made by each printing character on the plate.

It will be apparent that I have devised a new and useful machine for carrying out the curving operation, which machine involves a hitherto unknown principle in the art, which is, that in order to efficiently bend printing plates it is necessary that the pressure be applied simultaneously throughout the entire surface of the plate.

It will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing any of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a machine for curving printing plates, the combination of two members having oppositely disposed concentrically curved complementary, concave and convex faces, a resilient facing on the concave member, and means for bringing said members together and subjecting a printing plate disposed therebetween to pressure, whereby said yielding facing is forced between the lines of printing characters on said plate to evenly distribute the pressure thereon and said plate is bent to conform to the curvature of the faces of said members. 70
2. In a machine for curving printing plates, the combination of two members having oppositely disposed concentrically curved complementary, concave and convex faces, a resilient facing on the concave member, and means for bringing said members together and subjecting a printing plate disposed therebetween to pressure, whereby said resilient facing is forced between the lines of printing characters on said plate to evenly distribute the pressure thereon and said plate is bent to conform to the curvature of the faces of said members. 80
3. In a machine for curving printing plates, the combination of two members having oppositely disposed concentrically curved complementary, concave and convex faces, a rubber facing on the concave member, and means for moving one of said members toward the other and subjecting a printing plate disposed therebetween to pressure, whereby said rubber facing is forced between the lines of printing characters on said plate to evenly distribute the pressure thereon and said printing plate is bent to conform to the curvature of the faces of said members. 85
4. In a machine for curving printing plates, the combination of two members having oppositely disposed concentrically curved complementary, concave and convex faces, a resilient facing on the concave member, the face of the other of said members being non-resilient, and means for bringing said members together and subjecting a printing plate disposed therebetween to pressure, whereby said resilient facing is forced between the lines of printing characters on said plate to evenly distribute the pressure thereon and said printing plate is bent to conform to the curvature of the faces of said members. 90
5. In a machine for curving printing plates, the combination of two members having oppositely disposed concentrically curved complementary, concave and convex faces, a rubber facing on the concave member, the face of the other of said members being non-resilient, and means for bringing said members together and subjecting a printing plate disposed therebetween to pressure, whereby said rubber facing is forced between the lines of printing characters on said plate to evenly distribute the pressure thereon and said printing plate is bent to conform to the curvature of the faces of said members. 95
6. In a machine for curving printing plates, the combination of a bed, a member fixed thereon, and having a convexly curved face, a member movably mounted above said bed and having a complementary face concavely curved concentrically with the face of said first-mentioned member, a resilient facing on said movably mounted member, and means for moving said movably mounted member toward said fixed member to subject a printing plate disposed therebetween to pressure, whereby said resilient facing is forced between the lines of printing characters on said plate to evenly distribute the pressure thereon and said printing plate is bent to conform to the curvature of the faces of said members. 100
7. In a machine for curving printing plates, the combination of a bed, a member fixed thereon, and having a convexly curved face, a member movably mounted above said bed and having a complementary face concavely curved concentrically with the face of said first-mentioned members, a rubber facing on said movably mounted member, and means for moving said movably mounted member toward said fixed member to subject a printing plate disposed therebetween to pressure, whereby said rubber facing is forced between the lines of printing characters on said plate to evenly distribute the pressure thereon and said printing plate is bent to conform to the curvature of the faces of said members. 105
8. In a machine for curving printing plates, the combination of a frame, a bed thereon having a convexly curved face and adapted to support a plate to be curved, a head movable to and from said bed and having a complementary face concavely curved concentrically with said bed, a resilient facing on said head, and means for moving said head toward and from said bed, including an operating lever and a toggle connection between said lever and said head. 110
9. In a machine for curving printing plates, the combination of a frame, a bed thereon having a convexly curved face and adapted to support a plate to be curved, a head movable to and from said bed and having a complementary face concavely curved concentrically with said bed, a rubber facing on said head, and means for moving said head toward and from said bed, including an operating lever and a toggle connection between said lever and said head. 115
10. In a machine for curving printing plates, the combination of a frame, a bed thereon having a convexly curved face and adapted to support a plate to be curved, a 120

shaft above said bed, a bell-crank mounted on said shaft, arms pivotally mounted at one end of said frame, a head carried by said arms between said shaft and said bed and having a complementary face concavely curved concentrically with the face of said bed, a resilient facing on said head, and a connection between said head and one arm of said bell-crank lever comprising a shaft connected with said bell-crank lever, a shaft connected with said head, a block having segmental bearings interposed between said shafts providing a toggle adapted to force said head toward the bed upon operation of said bell-crank, and links disposed over the ends of said shafts to hold the shafts together and retain the block in position.

11. In a machine for curving printing plates, the combination of a frame, a bed thereon having a convexly curved face and adapted to support a plate to be curved, a

shaft above said bed, a bell-crank mounted on said shaft, arms pivotally mounted at one end of said frame, a head carried by said arms between said shaft and said bed and having a complementary face concavely curved concentrically with the face of said bed, a rubber facing on said head, and a connection between said head and one arm of said bell-crank lever comprising a shaft connected with said bell-crank lever, a shaft connected with said head, a block having segmental bearings interposed between said shafts providing a toggle adapted to force said head toward the bed upon operation of said bell-crank, and links disposed over the ends of said shafts to hold the shafts together and retain the block in position.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."