

No. 742,616.

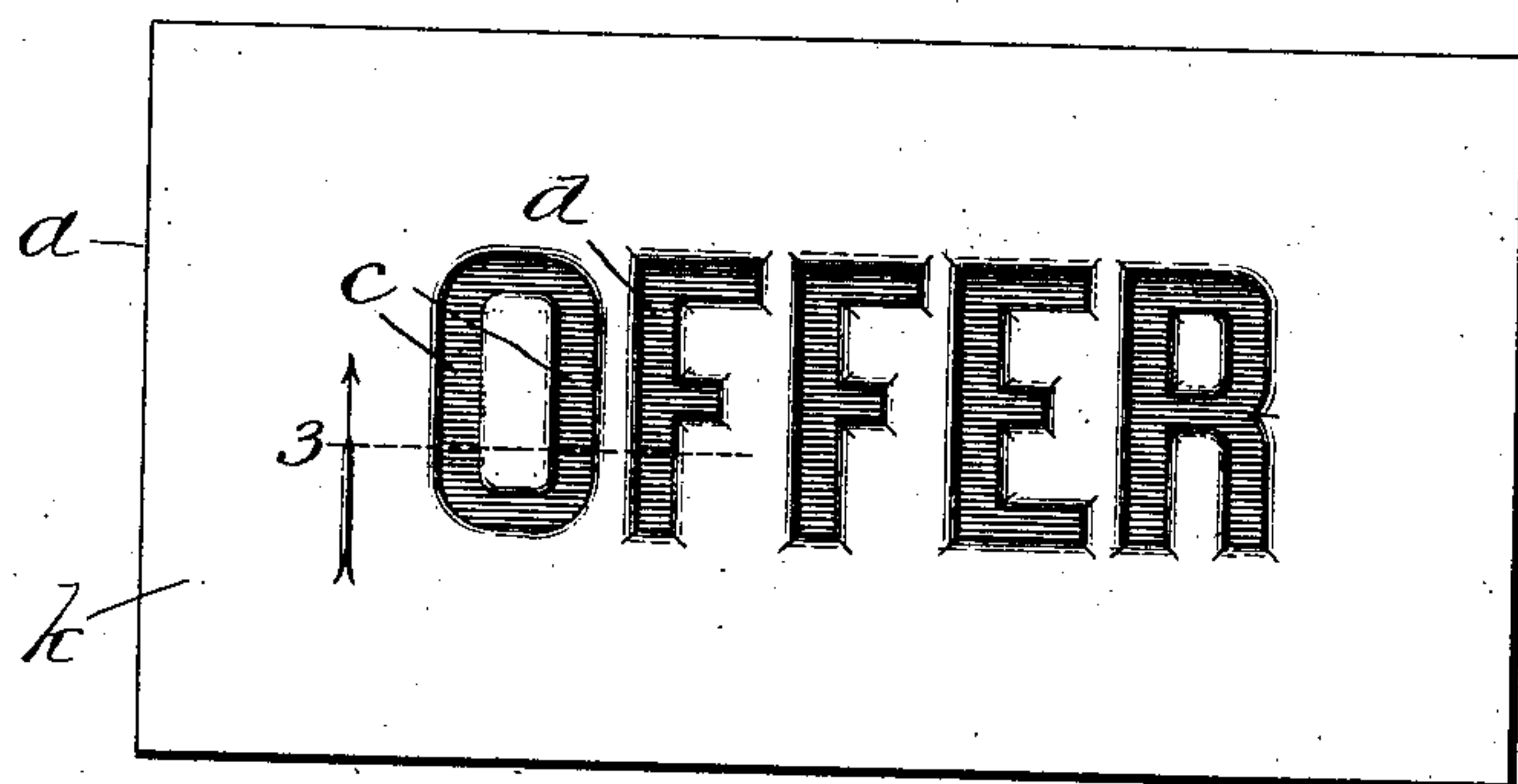
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C. W. EBERHARD.  
MECHANISM FOR ELECTROTYPING.

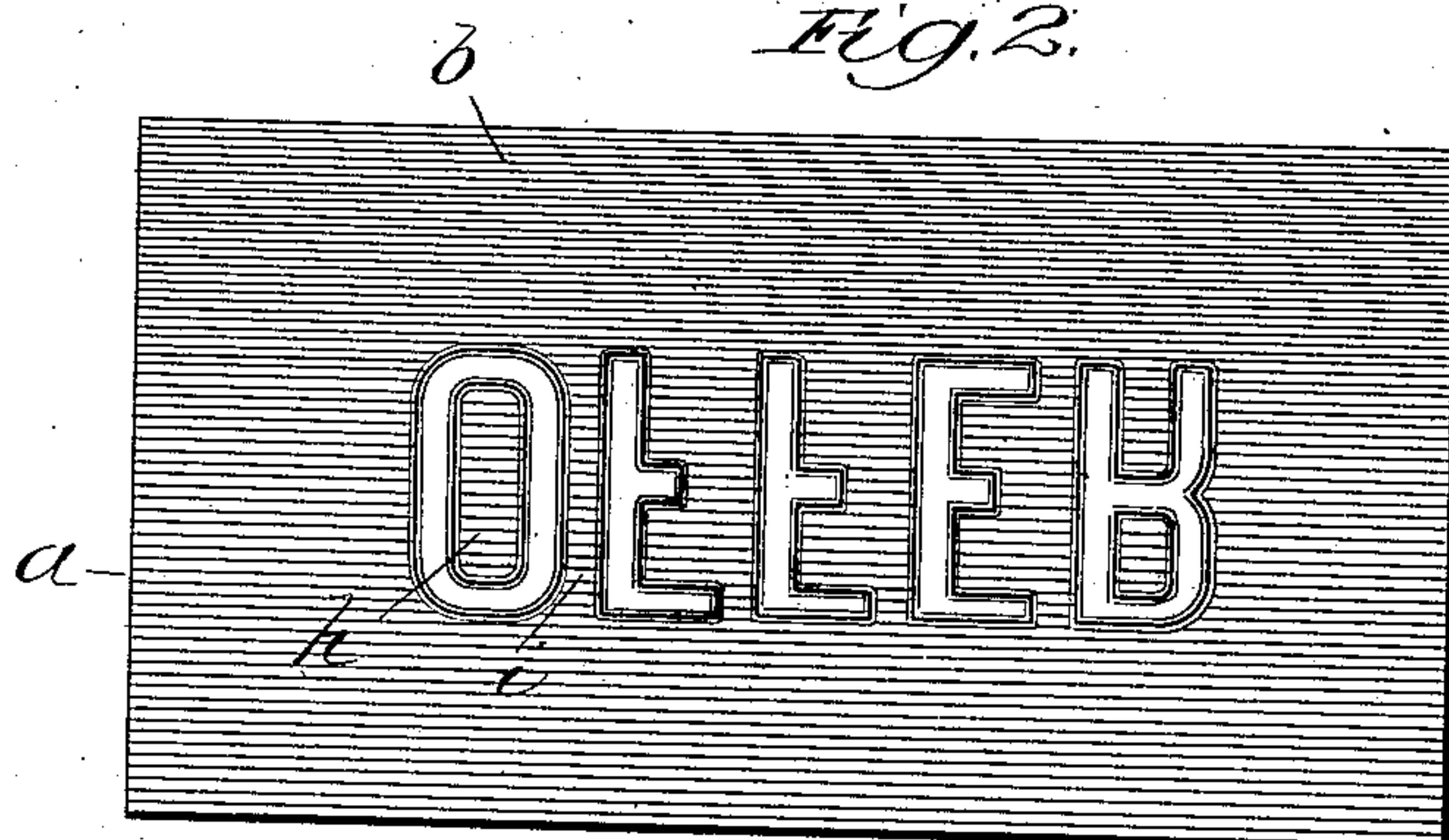
APPLICATION FILED APR. 15, 1901.

NO MODEL.

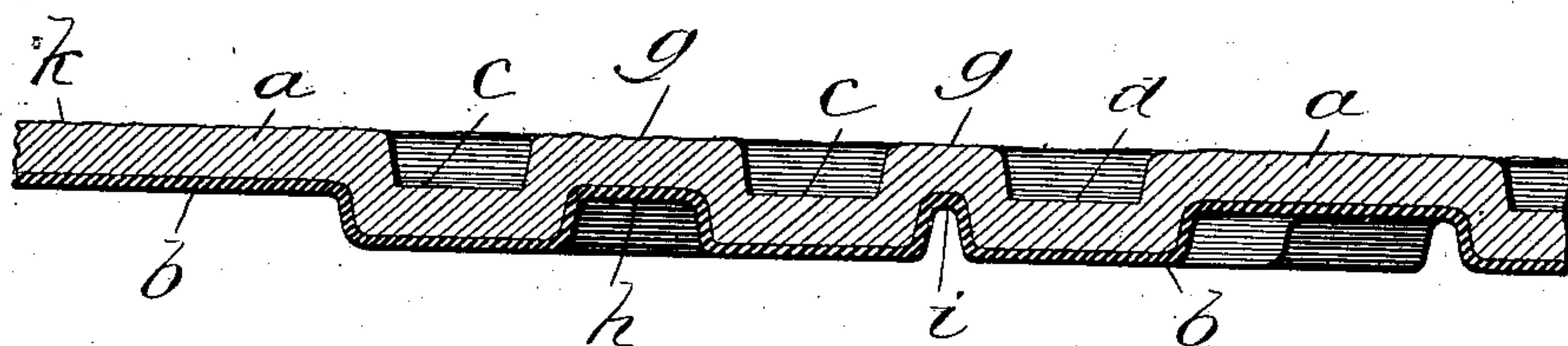
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

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## MECHANISM FOR ELECTROTYPING.

SPECIFICATION forming part of Letters Patent No. 742,616, dated October 27, 1903.

Application filed April 15, 1901. Serial No. 55,957. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES W. EBERHARD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Mechanism for Electrotyping, of which the following is a specification in its best form now known to me.

The object of my invention is to reduce the cost of making electrotypes.

My invention consists, primarily, in a mold for use in the process of making electrotypes which makes the process much simpler than any heretofore used, thereby dispensing with a large amount of the labor, and particularly the skilled labor, now required.

It also consists in the method and mechanism for using the mold, in many advantages, and in details of construction hereinafter more fully described and claimed.

The process of electrotyping as now used in commercial practice is as follows: A form of the matter to be electrotyped is made up in an ordinary printer's chase. The matter in this form may be one or more half-tones or other process cuts or a lot of reading matter set up in type or a combination of such cuts and reading matter. A mold consisting of about three-eighths of an inch of wax composition on a heavy inflexible metal back is laid upon the bed of a powerful press and the prepared form after being slightly warmed is placed face downward upon the wax. The press, which must be very powerful, is now set in operation and the form forced deep into the thick wax. The wax has to be thick, so that when the press has reached the bottom of its stroke the portion of the wax between the face of the form and the metal back of the mold will be hard and of uniform thickness and density, thereby insuring a clear-cut impression of the form. The wax, which is on the outside of the form, remains substantially the same thickness as at the start. The press is now loosened and the form removed. As the edges of the impressed portions of the wax are irregular and the portions themselves are thick, whereas the impressed portion is very thin, the wax impression cannot be used in its present form, and it is removed to another table, where a workman trims off the upper portion of the wax, leaving only the lower

solid portion, about an eighth of an inch in thickness, containing the impression which is to be preserved. To do this trimming a hot knife is used, and as it cuts horizontally over the sheet of wax it leaves the vertical sides of the impressions of the type with sharp edges, which are rounded off by passing a gas-flame over the impression. The workman now adds melted wax to form raised parts or "building" on the wax form where the finished electrotpe is to be wholly cut away. The finished wax impression, technically called a "case," above described is now put in a machine which sprinkles powdered black-lead over its surface, giving it a metal surface. From the black-leading machine the wax form or case is taken to the plating-bath, where it is inserted in the solution and a thin sheet of copper, called a "shell," is deposited over its surface. When a sufficient thickness of copper has been deposited, the case with the copper upon it, is removed from the electrotyping-bath. A little hot water is now applied to the copper side of the case, thereby softening the wax adjacent to it, and the thin copper shell is stripped off from the wax form. This copper plate is an exact reproduction of the matter appearing on the wax form or case, but has no printing strength, owing to its being very thin. The thin copper sheet or shell is now taken to the metal-backer, who first cleans the back of the copper plate with acid, then pours in melted tin-foil to tin its surface, and while this tin is in a molten condition metal is poured in. This combines with the tin and thus adheres to the copper shell or case. This metal-backing operation is performed on a level steel slab, so that the surface of the type in the copper shell is as near level as possible. Owing to the fact that type and cuts of different heights (due to wear and other reasons) were used in the original form and that the inequalities were impressed in the wax form and transmitted to the thin copper shell, it is practically impossible by this process to so back a plate that the surface of the cut will be level. It is necessary that the surface of the cut shall be level in order to print. The metal-backed copper shell is now sent to a highly-skilled workman, who examines it to see what portions of the printing-surface are not up



to level. He then places the plate face down on a level steel slab and pounds with a punch on the back of the low portions of the plate, thus forcing them to the level of the steel plate, and consequently the level of the remainder of the printing-surface. When this workman has finished his work, the plate is ready to be used either in a clamping-frame or with the usual wooden block as a back.

In the above process the press for use in forcing the form into the wax mold has to be very powerful in order to make a good impression, and when it is strong enough for this it also forces the wax into the little crevices between the type-bodies, thereby making the form stick in the mold. In breaking the hold of these little bonds the impression is pulled and distorted, thereby throwing the finished electrotpe out of level. The press is so powerful that when a form of type and cuts of varying heights are locked in a chase with the tops all on a level and used in it the type will be forced back until their bases are on a level against the top of the press, thereby impressing in the wax mold all the irregularities in level of the tops of the type which are due to differences in length of use and to slight differences in the foundry's standards. All of these differences increase the amount of work of the finisher, who brings the finished electrotpe up to level, and this man is one of the highest paid in the shop. Another highly-skilled and well-paid workman is the one who trims the wax mold. By the use of my invention I dispense in a large measure with the services of both of these workmen.

In the use of my invention I first prepare the form of matter in the usual manner, as heretofore described. I turn this form face downward on a level slab of steel or stone, loosen the furniture, and drive all the type and cuts into contact with the slab, thereby making the face level. I lock the form and secure the component parts in this position. I now dispense with the powerful press (often of fifty-five tons pressure to the square inch) used in the old process and in its place substitute a flat plate having a felt, soft-rubber, or other cushion covered roller weighing about twenty-five pounds, adapted to roll on a track at the proper distance above the surface of the plate and parallel with it. I can use in the place of this one of the well-known army hand-presses, in which such a roller is journaled on a fixed axis and the bed of the press travels under the roller and cover the same with felt. I can also use a hard-surfaced roller and spread a sheet of felt or other soft material over the mold below the roller. This felt or cushion pad, whether on the roller or elsewhere, as above described, serves the function of a cushion-pad in the same manner that it would if attached permanently to the flexible base of the mold. I can also use a very light direct-pressure press; but this does not give as satisfactory results as

the roller-press above described. I next dispense with the thick wax mold heretofore described and prepare as a substitute the mold of my invention in the following manner: I take a sheet of flexible material—such as a metal foil, heavy paper, closely-woven cloth, or sheet-rubber, but preferably lead-foil about .01 of an inch in thickness—and spread upon one side of it a coating of wax-like substance about one thirty-second to one-sixteenth of an inch in thickness. This coating should be applied while warm, so that it will stick to the flexible base. It should be of a wax or wax-like composition of such a hardness that it will make a clear detailed impression of type matter when impressed with the roller above described upon a form and yet hard enough so that it cannot easily be moved by ordinary handling. It should be of such a consistency that the finished mold can, if made on sufficient length of backing, be rolled up or passed in the form of a belt over large rollers without injuring the wax face. The combined base and wax face should be of such a strength that when an impression is made in it the mold may be subjected to ordinary handling without bending and injuring the impression. The consistency of the wax and the thickness of the flexible base of the mold should be such that when a form of matter is impressed in the mold the detail will all be clearly impressed in the wax, while the mold, including the flexible base, will be impressed into the larger hollow spaces of the form, thereby producing raised parts on the wax side of the mold corresponding to the building, which is applied by hand in the old process, but this without ever bringing the type of the form into direct contact with the flexible back—i. e., without ever passing entirely through the wax. The resulting product magnified several times is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a mold having the word "Offer" impressed therein. Fig. 2 is an inverted plan or bottom view of the same mold, showing the raised impression of the letters produced upon the under side of the mold. Fig. 3 is a sectional view taken on line 3 of Fig. 1, showing the letters "O" and "F" in section. In this section *a* represents the wax-like material, and *b* the foil. *c* represents the portion of the mold which will make the printing-face of the letter "O" in the electrotpe, and similarly *d* represents the portion of the mold which will make the printing-face of the letter "F" in the electrotpe. *g* represents the building effect between these letters produced by the bending of the entire mold in the curves *h* and *i* in the manner heretofore described. *k* represents similarly the building effect at the side of the mold. Where a large photo cut is being produced, the face of the cut lies in the plane *c d*, and its outer edge is surrounded by comparatively small building effect, corresponding to *k*.

While many different forms of wax may be



used, I prefer to use a composition of about ninety (90) per cent. ozocerite and about ten (10) per cent. white-pine pitch, with a very small quantity of vaseline added, about a tablespoonful to ten (10) pounds of ozocerite. I can also use in warm weather a composition composed of about sixty (60) per cent. shellac, twenty (20) per cent. sulfur, and twenty (20) per cent. gum-turpentine, the proportions in both these compositions being varied somewhat with the temperature of the room and with different brands of the materials used. In a very warm room ordinary beeswax with a little black-lead may be used, and in a cooler room beeswax with turpentine may be used.

While, as heretofore stated, various flexible materials may be used as a base for the mold, I prefer to use a metallic foil, such as lead-foil, which is an electrical conductor, so that electricity may be carried through it to the black-leaded face of the wax mold, contact being obtained by scraping the wax off from a small portion of the face of the mold (at one side of the impressed portion) before the mold is black-leaded. This solves one of the difficulties of electrotyping, that of obtaining a good electrical contact with the black-leaded face of the wax impression or case.

Having prepared the above-described mold, I slightly warm the form of matter to be reproduced and place it face upward on the plate above described. I place the mold face downward upon this form and pass the felt-covered roller over the back of the mold. This forces the mold onto the face of the form, impressing the detail of the form into the wax-like surface and forcing the yielding flexible base of the mold with the wax upon it into the larger openings in the face of the form which is to be reproduced, thereby making simultaneously with the printing impression the building effect, which had in the old process to be made by hand after the wax impression was trimmed. As the roller passes over the mold, touching it in only one line at a time, it gives the mold at the point of contact a slightly-rocking motion, thereby rounding off the edges of the depths between the letters. This motion is not, however, sufficient to disturb in any way the face of the impression.

My mold has an additional advantage in that the wax of the mold being thin the shape of the impression is not destroyed or distorted by the expansion of the wax to any such extent as with the thick wax molds heretofore used, and the expansion of the little wax which is present is in a large measure

taken up or compensated for by the metal-foil base, whose coefficient of expansion is much less than that of the wax.

After the soft roller has forced the mold into the form in the manner described the mold is removed. If it is of the preferred form, with a metallic-foil base, a small portion of the wax on the face of the foil is removed, as heretofore described. The mold is then black-leaded in the usual manner, and after being inserted in a frame to protect the back of foil base from the copper solution it is inserted in the copper-bath. The black-lead face is connected through the foil back to the proper pole of the battery. The copper shell is now deposited and the electrototype completed in the manner heretofore described, except that when the metal-backed electrototype made from an impression produced in one of my molds, as above described, comes to the finisher it is found that owing to the fact of so light a press having been used in the molding the level of the face of the form of type was not distorted and that consequently the printing-surface of the electrototype is so nearly true to level that practically no work is required of the finisher in making it true, and I am therefore able to dispense in a large measure with his services, thereby saving considerable expense.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A mold for use in electrotyping composed of a thin sheet of metallic foil and a thin coating of wax-like material secured thereto substantially as described for the purposes set forth.

2. A mold for use in electrotyping composed of a thin sheet of lead-foil and a thin coating of wax-like material secured thereto substantially as described for the purposes set forth.

3. A mold for use in electrotyping composed of a thin sheet of lead-foil and a thin coating of wax-like material composed of ozocerite, white-pine pitch and vaseline in about the proportion named, substantially as described for the purposes set forth.

4. A mold for use in electrotyping composed of a thin coating of wax-like material composed of ozocerite, white-pine pitch and vaseline in about the proportions named substantially as described for the purposes set forth.

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