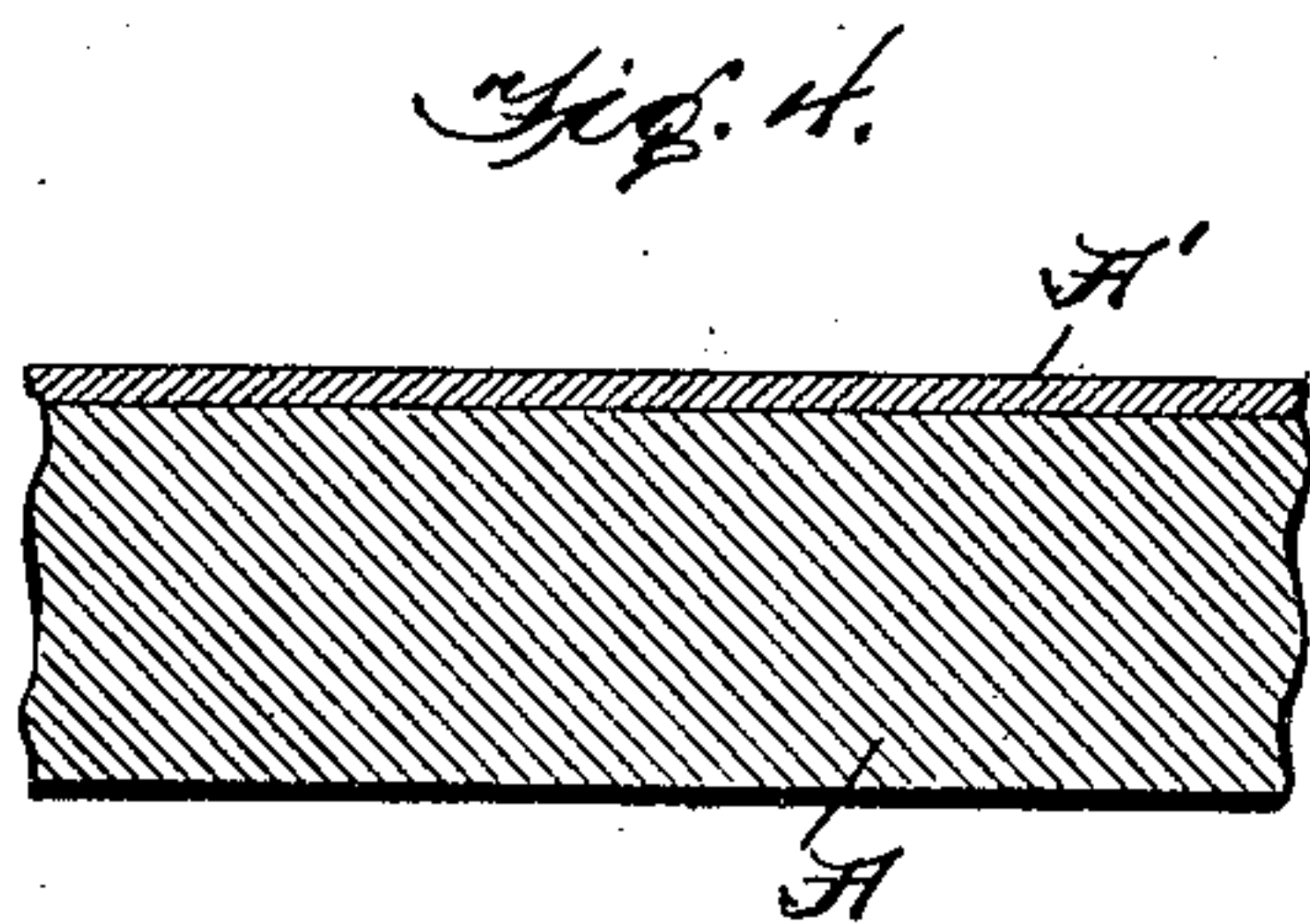
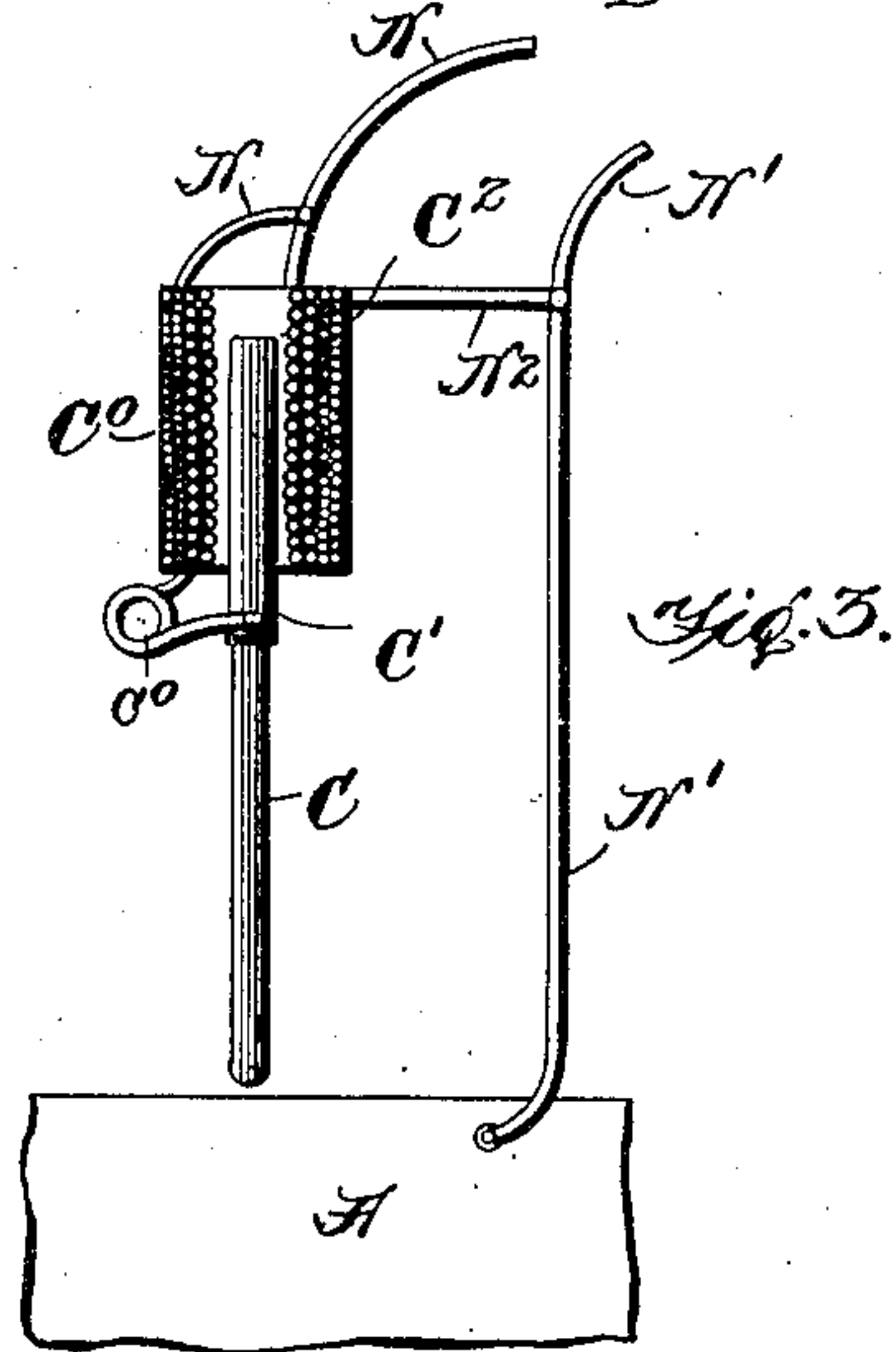
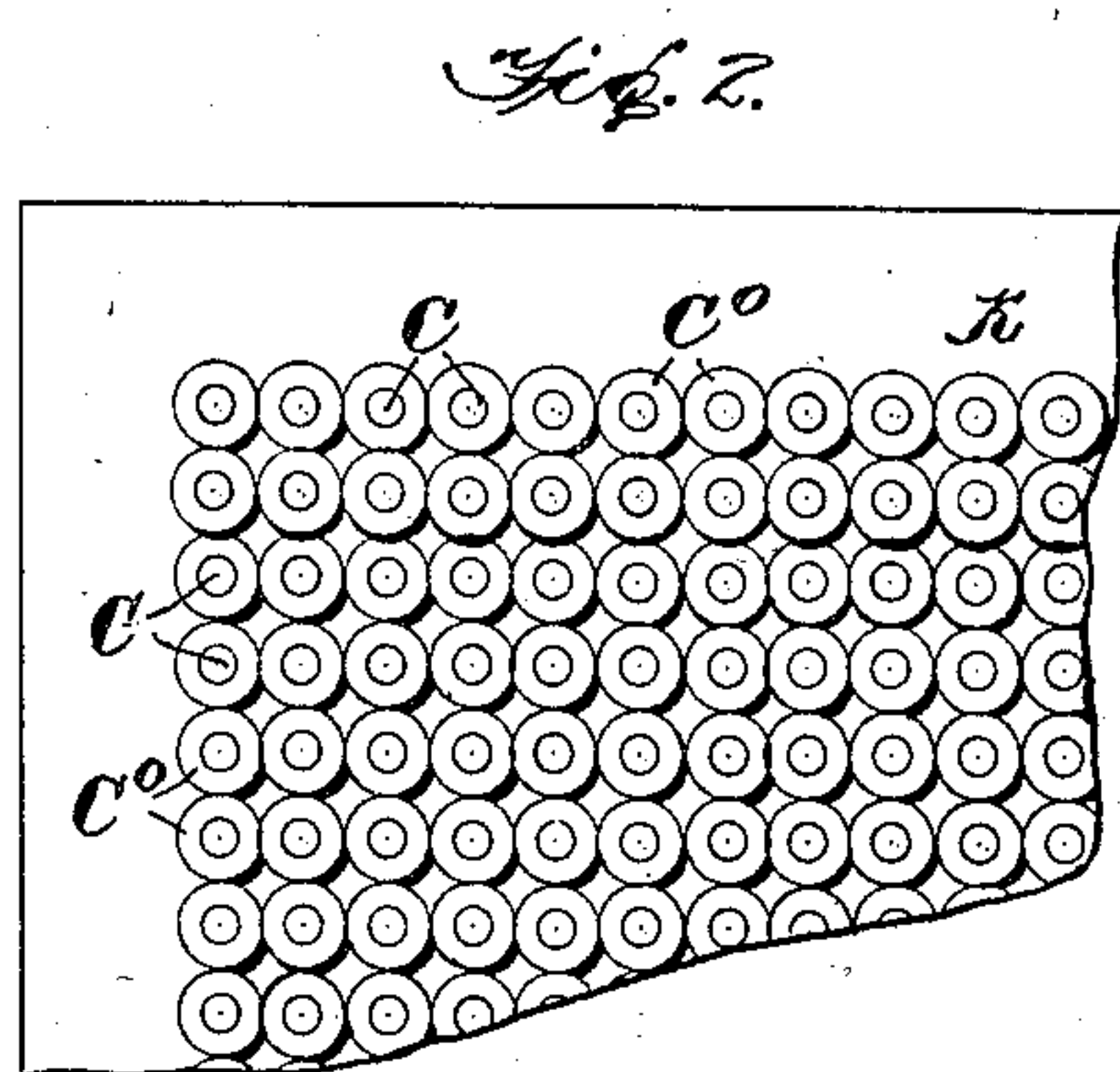
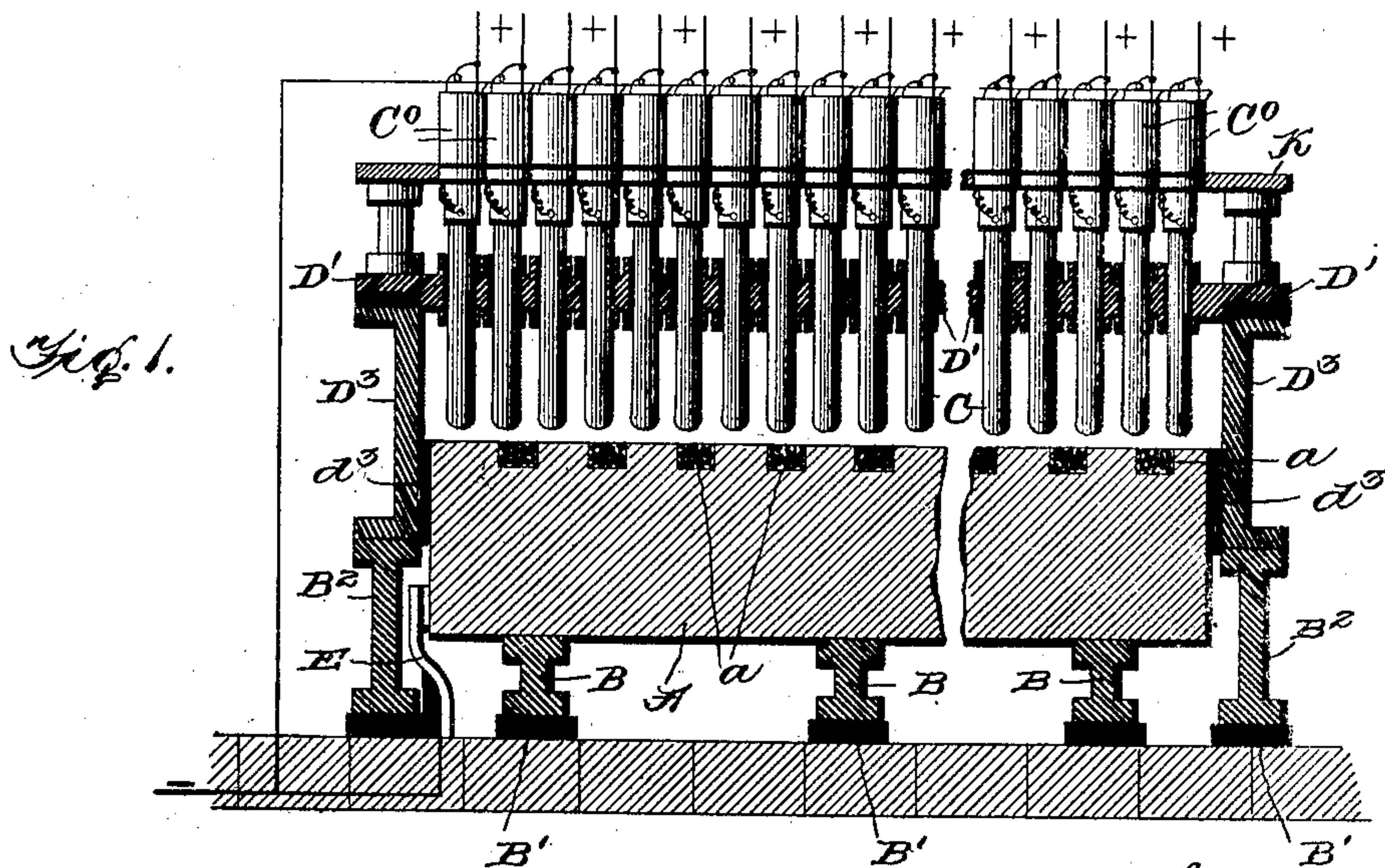


C. DAVIS.
METHOD OF TREATING STEEL PLATES.
APPLICATION FILED NOV. 12, 1902.

935,358.

Patented Sept. 28, 1909.



Witnesses:
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UNITED STATES PATENT OFFICE.

CLELAND DAVIS, OF THE UNITED STATES NAVY.

METHOD OF TREATING STEEL PLATES.

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Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed November 12, 1902. Serial No. 131,025.

To all whom it may concern:

Be it known that I, CLELAND DAVIS, lieutenant in the United States Navy, stationed at Washington, in the District of Columbia, have invented certain new and useful Improvements in Methods of Treating Steel Plates; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to improvements in the manufacture of steel plate, and it consists in an improved method of incorporating into the face of the plate some other metal or metallic compound such as nickel, chromium, or the like, or alloys or compounds of the same, or other elements or compounds which may be advantageously employed.

My invention is especially adapted to the manufacture of improved armor plate.

It is well known that the use of certain metallic elements, such as nickel and chrome in steel, impart to it qualities that increase its value for armor plate. But conditions of manufacture, well known in the art, limit the employment of these metals, so that it is not practicable with present methods to utilize them to the best advantage.

The object of my invention is to incorporate these ingredients so that a portion only of the plate will be impregnated, at the same time maintaining the integral molecular character of the whole.

The substance to be incorporated may be laid on the face of the plate in a thin sheet, or in the form of a granular mass, or may be inserted in pockets drilled, pressed, or cast into the plate, or in any other convenient way. Then the face of the plate is subjected to a temperature high enough to melt both the face of the plate and the material to be incorporated, and the latter will become incorporated or dissolved in the molten metal, thus altering the properties of that face of the plate. To prevent oxidation it will ordinarily be preferable to exclude the air from the portion of the plate being treated. This melting of the face of the plate, with the material to be incorporated therein, is accomplished by means of an electric arc, as will be hereinafter described. Furthermore, if it be desired to incorporate carbon into the face of the plate at the same time that

the metal or metallic compound is to be incorporated, this may be done by using carbon electrodes.

The accompanying drawings illustrate diagrammatically the apparatus for putting my said invention into practice.

The same letters refer to the same parts in the several views.

Figure 1 represents a transverse section through a plate provided with pockets for the material to be incorporated, and shows the electrodes in elevation and the casing in section. Fig. 2 is a plan view of a part of the cover of the casing shown in Fig. 1, and shows the distribution of the electrodes, the conductors being omitted. Fig. 3 shows the apparatus for automatically feeding the electrodes, and Fig. 4 shows a plate with the material to be incorporated resting thereon in the form of a flat plate.

A represents the plate to be treated which, in the form shown in Fig. 1, is provided with pockets *a* for the material to be incorporated. In the form shown in Fig. 4, this material to be incorporated is in the form of a flat plate *A'*. The plate *A* rests on suitable rails, or other supports *B*, which are insulated as shown at *B'*. The beams *B²* and *B³*, and the cover *D'* form a casing which effectually screens the plate from air while it is being treated. The joints between the plate and the sides *D³* of the casing are stopped with asbestos or other refractory material *d³* to prevent the escape of any of the molten metal from the top of the plate.

The electrodes *C* are mounted in suitable holes *C⁰* carried by the plate *K*, which is mounted above the cover *D'*. The current passes through these electrodes, and is carried off by the conductor *E*. Where carbon electrodes are used, it is desirable to have automatic devices for feeding the same toward the plate, and Fig. 3 shows one well known apparatus for this purpose, which comprises the springs *c⁰* connected to the magnetic holder *C'* which moves up or down in the coils *C²* as the current varies through the conductors *N*, *N'* and *N²*. This automatic feed is not a part of my invention, and any other suitable device for the purpose may be adopted if desired.

If it is only desired to subject the face of the plate to the high heat requisite, any suitable metallic electrodes may be used, such as platinum; but if carbon is also to be impreg-

nated, carbon electrodes may be used, in which case an automatic feed to adjust the length of the arc will be required.

The current may be turned on to all the electrodes at once if desired, or on groups of the electrodes, thus heating portions of the face of the plate, and thus progressively treating the entire plate; or the plate may be moved under the electrodes, or the electrodes may be moved over the face of the plate, as may be preferred.

It will be obvious that various modifications in the herein described apparatus may be used, which could be used without departing from the spirit of the invention, but I claim broadly as new:

1. The herein described process of impregnating the face of a previously formed plate with a foreign metal or metallic substance, which consists in applying such substance to the surface portion of the plate while the latter is in a solid condition, and then melting the surface portion of the plate and the substance by an electric arc, the melting operation being carried out in a closed chamber to prevent oxidation.

2. The herein described process of impregnating the face of a steel plate with foreign matter, which consists in applying said matter to the face of said plate, and thereafter melting the face of the plate and the matter by means of an electric arc, the face of the plate under treatment being in the meantime screened from air.

3. The herein described process of impregnating the face of a steel plate with other metallic substances, which consists in

applying the material to be incorporated to the face of the plate, and thereafter melting said material and the steel along the face of the plate by means of an electric arc, the face of the plate under treatment being in the meantime screened from air.

4. The method of incorporating foreign matter into the face of a steel plate and in simultaneously carburizing said face, which consists in applying the said matter to the face of said plate, thereafter melting said face and said matter by means of an electric current from a carbon electrode or electrodes, and continuing the current until the desired degree of carburization has been secured, the face of the plate under treatment being in the meanwhile screened from air.

5. The method of incorporating other metallic matter into the face of a steel plate and in simultaneously carburizing said face, which consists in applying the said matter to the face of said plate while both are in the metallic form, melting said face and said matter by means of an electric current from a carbon electrode or electrodes, and continuing the current until the desired degree of carburization has been secured, the face of the plate under treatment being in the meanwhile screened from air.

In testimony whereof, I have affixed my signature, in presence of two witnesses.

CLELAND DAVIS.

Witnesses:-

GRAFTON L. MCGILL,
J. STEPHEN GIUSTA.