

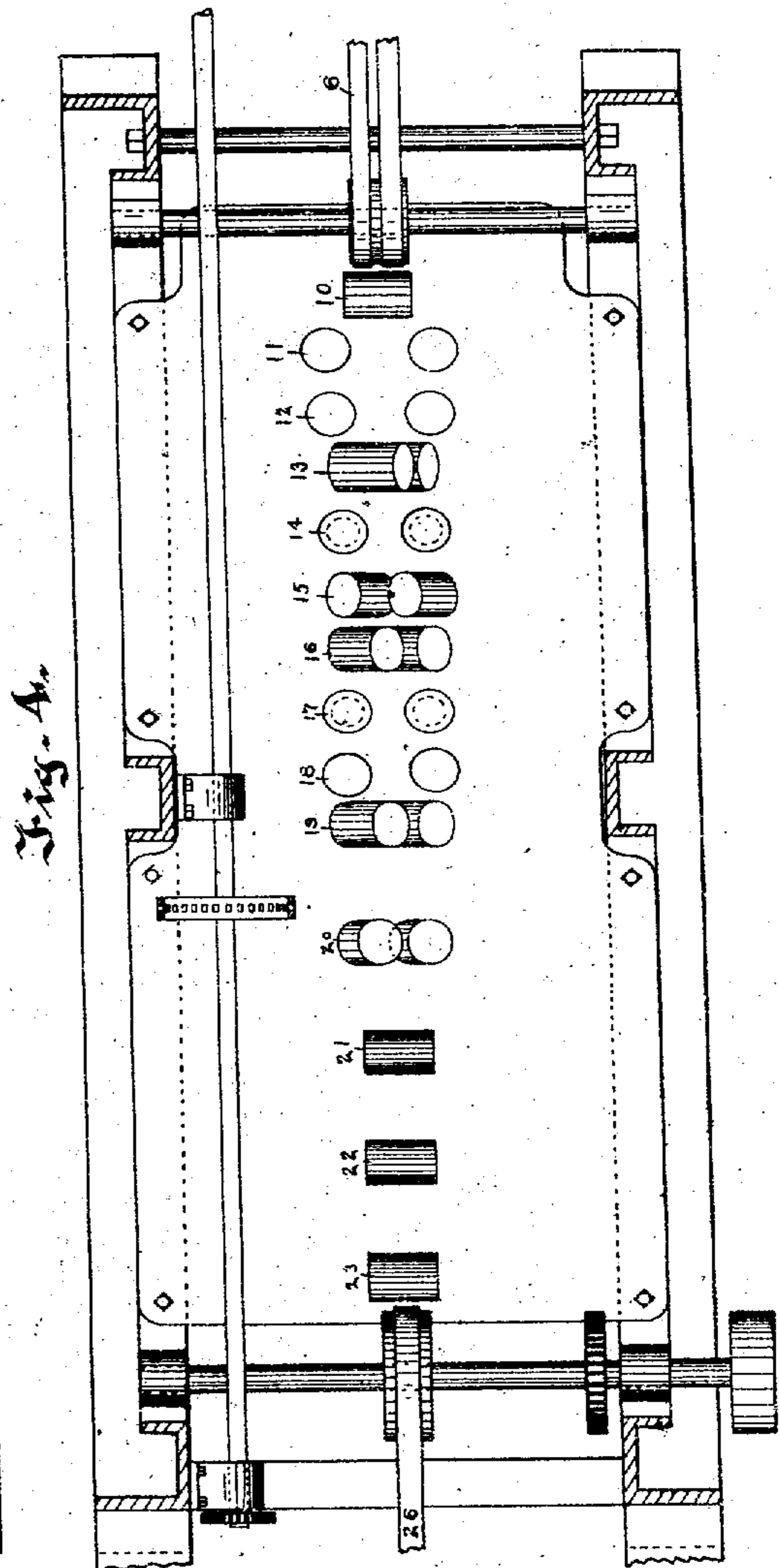
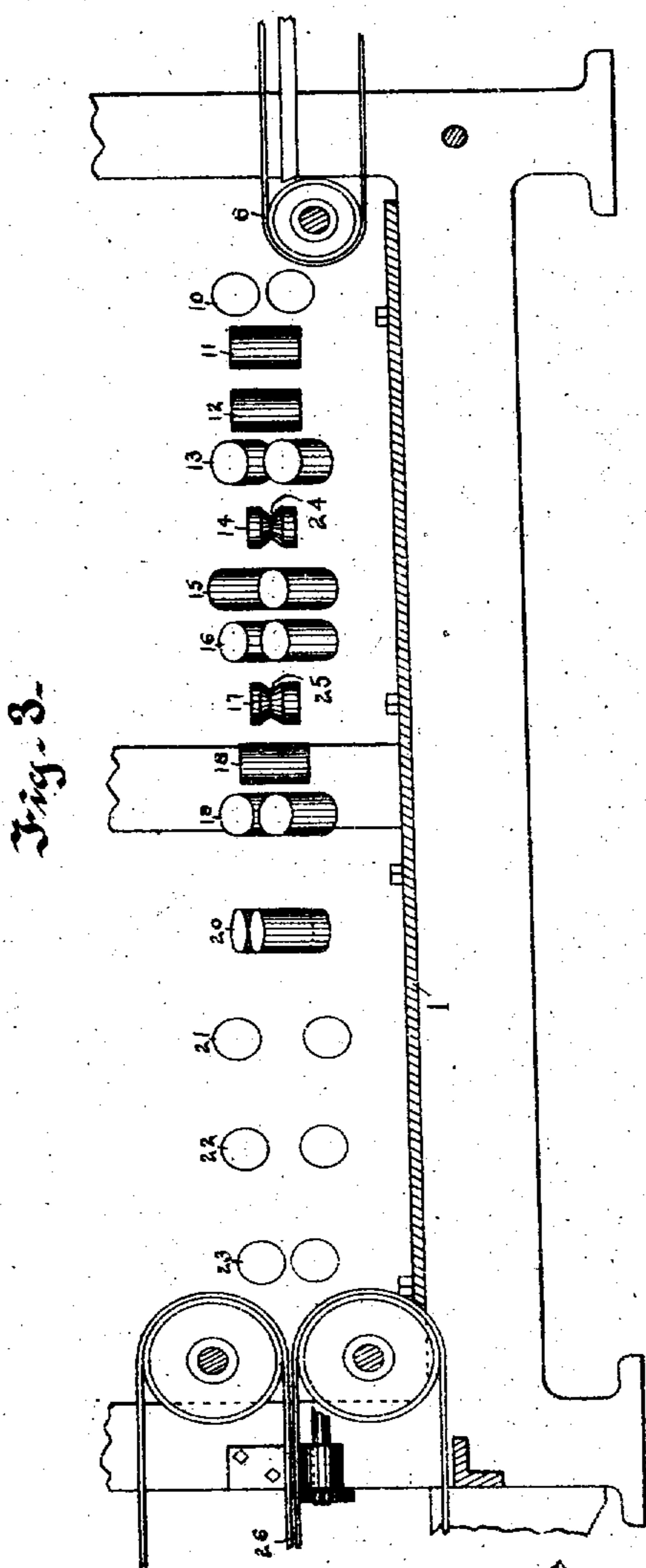
(No Model.)

2 Sheets—Sheet 1.

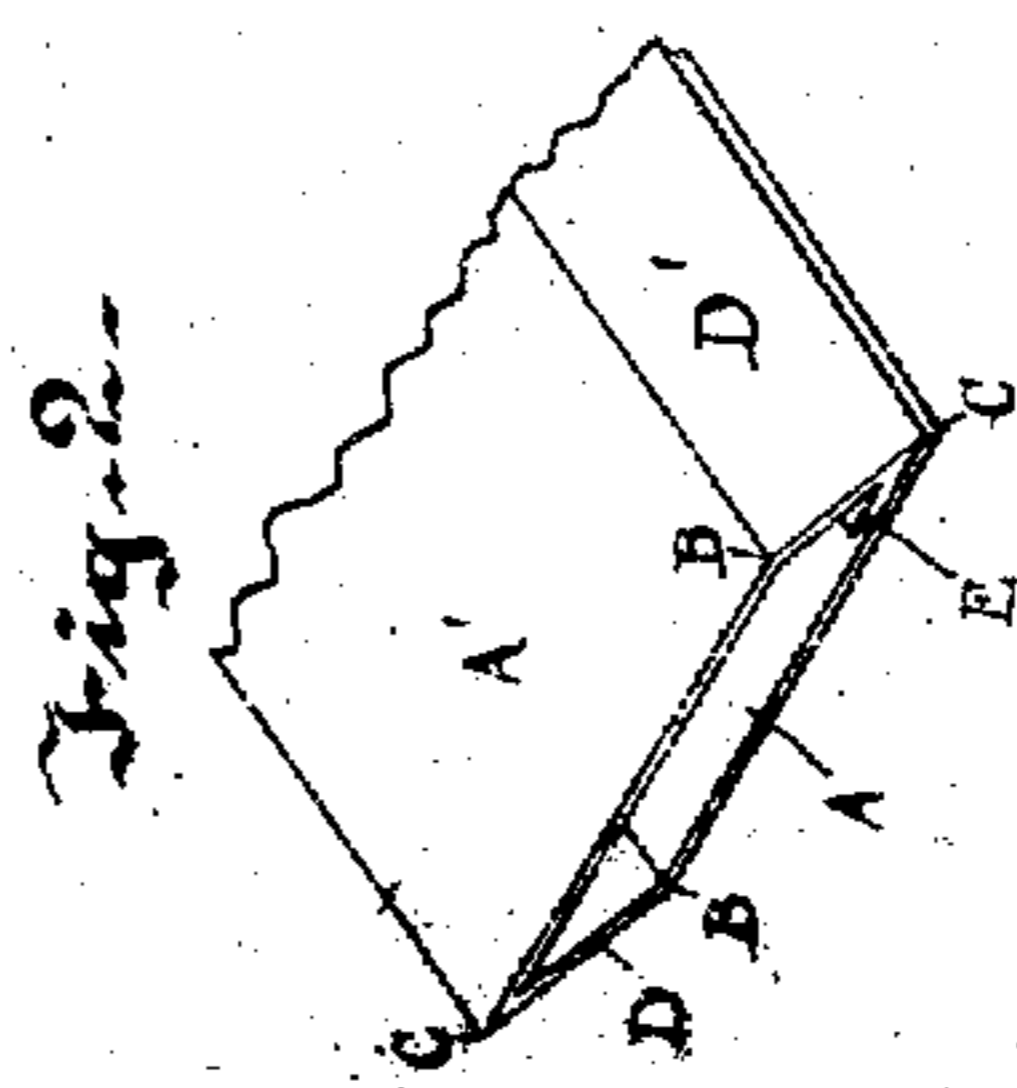
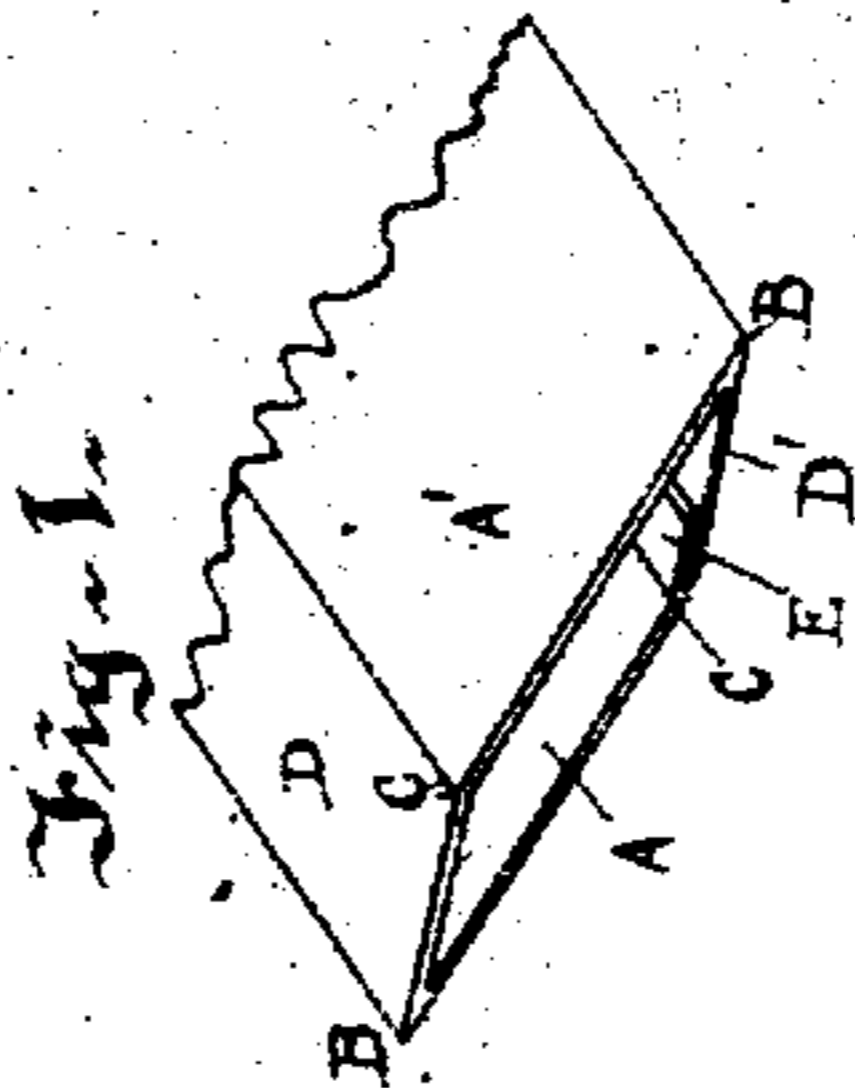
H. R. CORKHILL, Jr.
MACHINE FOR REFOLDING PAPER TUBES.

No. 605,053.

Patented May 31, 1898.



Witnesses:
J. A. Roda
G. Willard Rich.



Inventor:
Henry R. Corkhill
by Charles H. Church
Attorney.

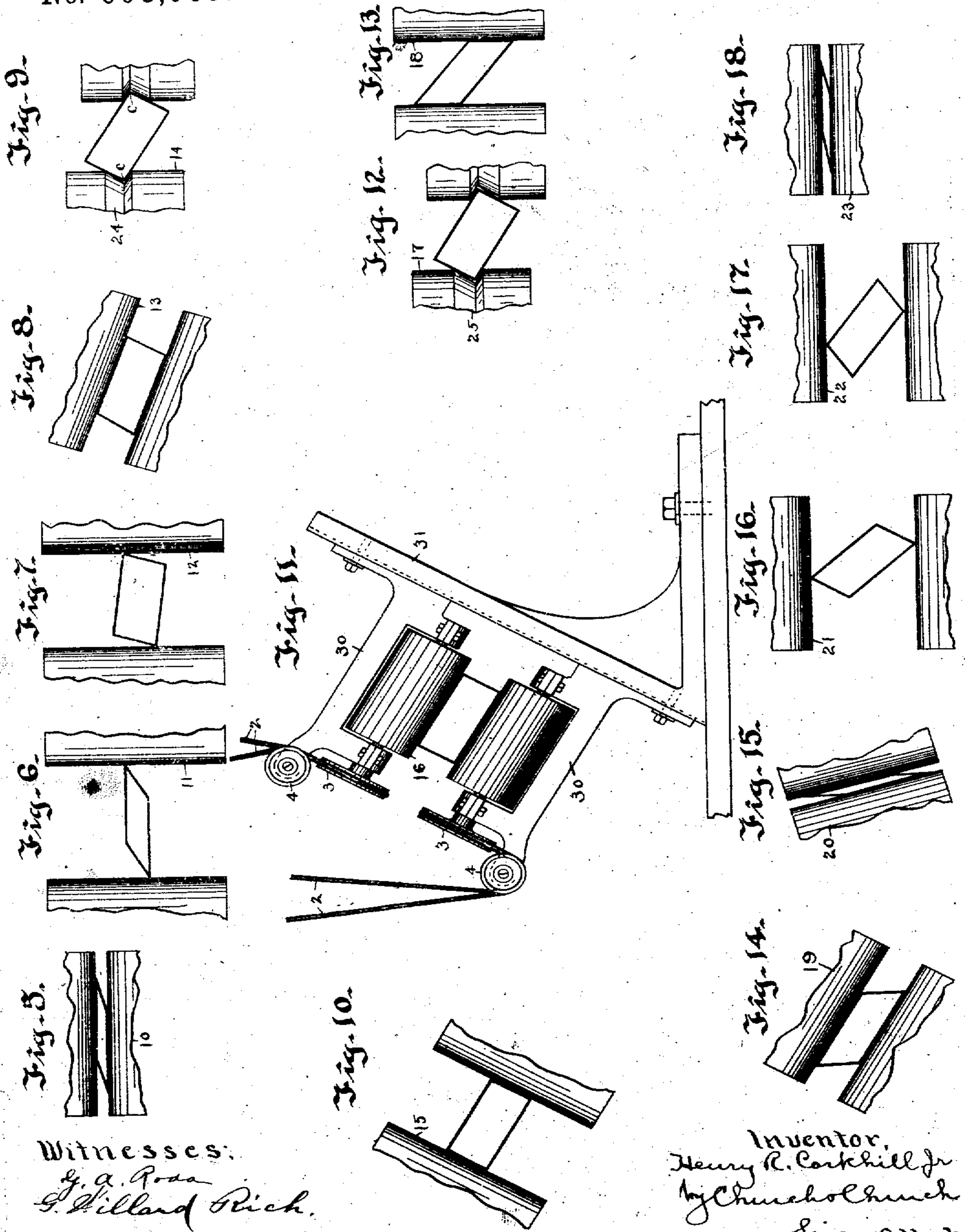
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2 Sheets—Sheet 2.

H. R. CORKHILL, Jr.
MACHINE FOR REFOLDING PAPER TUBES.

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Witnesses:
G. A. Ross
F. Willard Rich.

Inventor,
Henry R. Corkhill Jr.
by Church & Church
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UNITED STATES PATENT OFFICE.

HENRY R. CORKHILL, JR., OF ROCHESTER, NEW YORK.

MACHINE FOR REFOLDING PAPER TUBES.

SPECIFICATION forming part of Letters Patent No. 605,053, dated May 31, 1898.

Original application filed April 1, 1895, Serial No. 544,033. Divided and this application filed December 20, 1895. Serial No. 572,763. (No model.)

To all whom it may concern:

Be it known that I, HENRY R. CORKHILL, Jr., of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Machines for Refolding Paper Tubes; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference numerals and letters marked thereon.

My present invention has for its object to provide devices for refolding or breaking back the paper tubes which constitute the exterior shells of sliding paper boxes; and it consists in certain improvements hereinafter described, the novel features being pointed out in the claims at the end of this specification.

In the drawings, Figure 1 is a view of the end of the tube before being refolded; Fig. 2, a similar view after being refolded; Fig. 3, a side elevation of the refolding-die; Fig. 4, a plan view of the same; Figs. 5 to 18, sectional views taken through the various parts of the refolding-die.

Similar reference letters and numerals in the several figures indicate similar parts.

In my prior patent, No. 554,987, dated February 18, 1896, this being a division of the application for said patent, I have described in detail a complete machine adapted to form the paper tubes or shells such as are adapted to be operated upon by the herein-described apparatus.

The paper tubes are preferably of such length that several shells for slide-boxes may be cut from them, and in Fig. 1 I have shown such a tube as it is delivered to the machine, said tube being composed of a single piece or strip of paper, cardboard, or similar material creased or scored longitudinally on the lines B B and C C, forming the broad panels A and A' and the narrow sides or panels D and D', the panels A and D' being preferably united by the pasting-flap E or in any other suitable manner. During the operation of forming this tube the blank has been bent or folded on the lines B B, and it is the object of my present machine to bend or refold the blank upon the lines C C, and in the present con-

struction preferably back again, so that the tube is delivered flat and in the form shown in Fig. 1. The object of thus refolding or bending the tube is to facilitate its being set up into rectangular shape to permit the ready introduction of the slide or box it is to contain and to prevent breaking on other lines than those on which it is creased or scored for the purpose. In Fig. 2 the blank is shown after it has been refolded or "broken" on the creased lines C C on which it was not folded during the formation and pasting of the tube, although it is preferably delivered from the machine in the form shown in Fig. 1, being folded back into the shape into which it was delivered to the refolding mechanism.

The means shown for turning the blank and bending it on the lines C C is a series of pairs of cylindrical rollers arranged upon a suitable supporting plate or frame 1, preferably attached to the main frame of a complete tube-forming machine, and I have indicated said rollers only diagrammatically—that is to say, their position and arrangement are shown; but for the sake of clearness the means for positively driving said rollers has been omitted, though I have shown in Fig. 11 mechanism for driving one pair of rollers, consisting of driving-belts 2, passing around pulleys 3, and similar belts are employed for driving each roller of all of the pairs, suitable guide-rollers 4 on the frames 30 of the rollers being employed, when desired, to direct the belts from their driving-pulleys to the driven pulleys on the rollers.

The tube in the form shown in Fig. 1 is delivered by suitable means, such as a conveying-belt 6, between the first pair of rollers 10, the succeeding pairs being indicated by 11, 12, and so on up to 23, and the positions of these rollers and the shape of the tube while passing between them are clearly shown in Figs. 5 to 18, inclusive, a detail description of the specific construction and arrangement of these rollers not being necessary, as they are clearly shown in the figures mentioned. Suffice it to say that they are cylindrical and all portions of the surfaces are equidistant from the axis, so that when the blank passes out from between the rollers 20, Fig. 15, it is in the shape shown in Fig. 2, having been

bent, folded, or broken flat on the creased lines C C, while the rollers 21, 22, and 23, operating on the sides and ends, as shown, bend it back again to the shape shown in Fig. 1, and it is delivered from between rollers 23 to any suitable receiving devices, as a pair of belts 26.

The object of employing cylindrical plain-faced rollers is to cause all portions of the surface of the rollers which act upon the tube to move at the same surface speed in order that there may be no wiping action on the printed matter, as would be the case if the rollers were conical.

The rollers from 10 to 20 constitute a die having movable walls or sides and operating to contract the tube gradually at the sides from the entrance end of the die and widening in a direction at right angles to the sides, and then gradually widening it in the direction of the sides of the tube and gradually contracting in a direction at right angles thereto, the shape of the die being approximately indicated by the cross-sections of the tube, (see Figs. 5 to 15,) the sides turning gradually around the plane of the longitudinal axis of the die, and two of the sides approach or are close together at the entrance and gradually separate, while the other two are separated and gradually approach until the center of the die is reached, where the four sides form a substantially rectangular aperture, and then the two previously-contracted die sides separate and the two previously-separated die sides approach, as shown in Fig. 15, at this point, the sides of the die having been given a half-turn on the longitudinal axis. Although I have shown the tube or shell as oblong in cross-section, it could be of other angular form, if desired. These refolding-rollers are driven at the same surface speed, and I find it desirable to make the rollers 14 and 17, which engage the tube or shell when nearly in rectangular form—that is, just before and after it is bent on the creased lines C C—with the grooves 24 and 25, the angles of the sides of the grooves being, however, a little less than the angles of the sides of the tubes, so that the corners of the tubes will not be crushed, but the sides will be engaged at a short distance from the corners, as clearly shown in Figs. 9 and 12. This construction I find to be advantageous, particularly of the rollers 17, because the blanks are to be bent on the lines C C at this point, and extreme pressure would be liable to crush the corners of the tubes.

It is desirable, although not essential, that the tubes after being folded once, as in Fig. 2, be refolded again on the creased lines B B to the shape shown in Fig. 1, and the rollers 21, 22, and 23 could be dispensed with, the blanks being delivered to suitable feeding-out devices or a receptacle in this shape; but I find that it is better to bend the tubes back to the shapes shown, as the creased lines are then more flexible and the tube can be set up

by hand easier for the reception of the boxes or slides. It will be noted that this refolding device is particularly adapted for operating on long tubes, which are subsequently to be cut up into sections the length of cigarette-boxes; and while I prefer that the space between the rollers 10 and 20 be approximately the length of the tube to be operated upon this is not essential.

The feature of employing movable sides for the refolding-die is advantageous, for the reason that tubes which have been printed or lithographed may be operated upon by the rotating surface without liability of the freshly-printed surface being marred or smeared, as would be the case were a die with stationary sides employed.

I claim as my invention—

1. As a means for refolding a flat tube of cardboard, previously creased longitudinally, a die composed of a series of plain-faced cylindrical positively-driven rollers with their axes of rotation disposed at various angles around the longitudinal axis of the die, said die changing in shape from front to rear, from approximately a line to rhomboidal, then rectangular and then rhomboidal again with the angles reversed from the previous one and then approximately a line, substantially as described.

2. As a means for refolding a flat tube of cardboard, previously creased longitudinally, a die composed of a series of plain-faced cylindrical positively-driven rollers with their axes of rotation disposed at various angles around a longitudinal axis, said die changing in shape from front to rear, from approximately a line to rhomboidal, then rectangular, then rhomboidal again with the angles reversed, then approximately a line, and a series of other cylindrical driven rollers having their surfaces approximately at right angles to the longer axis of the last rhomboidal shape of the die, for flattening the blank to first position, substantially as described.

3. As a means for refolding a flat tube of cardboard previously creased longitudinally, a die composed of a series of plain-faced cylindrical positively-driven rollers with their axes of rotation disposed at various angles around the longitudinal axis of the die, said die changing gradually in shape from approximately a line to rhomboidal, then rectangular, then rhomboidal again with the angles reversed, then approximately a line, and two pairs of rollers intermediate the length of the die having grooves formed therein, the walls of which are at a lesser angle than the portions of the tube with which they contact, whereby the tube will be refolded and the corners protected from direct contact with the rollers when moving to and from a right angle, substantially as described.

4. As a means for folding or "breaking back" a flat cardboard tube, the opposite sides of which have been previously creased longitudinally near opposite edges, a die having

four moving sides, composed of plain-faced cylindrical rollers, with their axes of rotation disposed at various angles to and extending gradually around the longitudinal axis of the die, two of said sides at the entrance being close together, and two separated, and the two separated ones gradually approaching and the two close together gradually separating until the die is of rectangular form, and then the two previously-separated ones approach and the two formerly close together separate again to normal width, and two pairs of rolls with their axes in a plane approxi-

mately at right angles to the plane of the exit end of the die, the rolls of the first pair being more widely separated than those of the second pair, the whole arranged and operating to bend the tube in rectangular form, then flatten it, bending it on the creased lines, and finally flatten it again in the form in which it entered the die, substantially as described.

HENRY R. CORKHILL, JR.

Witnesses:

F. F. CHURCH,
G. A. RODA.

Correction in Letters Patent No. 605,053.

It is hereby certified that Letters Patent No. 605,053, granted May 31, 1898, upon the application of Henry R. Corkhill, jr., of Rochester, New York, for an improvement in "Machines for Refolding Paper Tubes," were erroneously issued to said Corkhill as owner of the said invention; whereas said Letters Patent should have been issued to the *Stecher Lithographic Company, of same place*; said company being owner of the entire interest, as shown by the record of assignments in this office: Also, that the "Serial No." of the original application printed at the head of the specification should read 544,032, instead of "544,033;" and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 7th day of June, A. D., 1898.

[SEAL.]

Countersigned:

C. H. DUELL,

Commissioner of Patents.

WEBSTER DAVIS,

Assistant Secretary of the Interior.

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WEBSTER DAVIS,
Assistant Secretary of the Interior.

Countersigned:

C. H. DUELL,
Commissioner of Patents.