

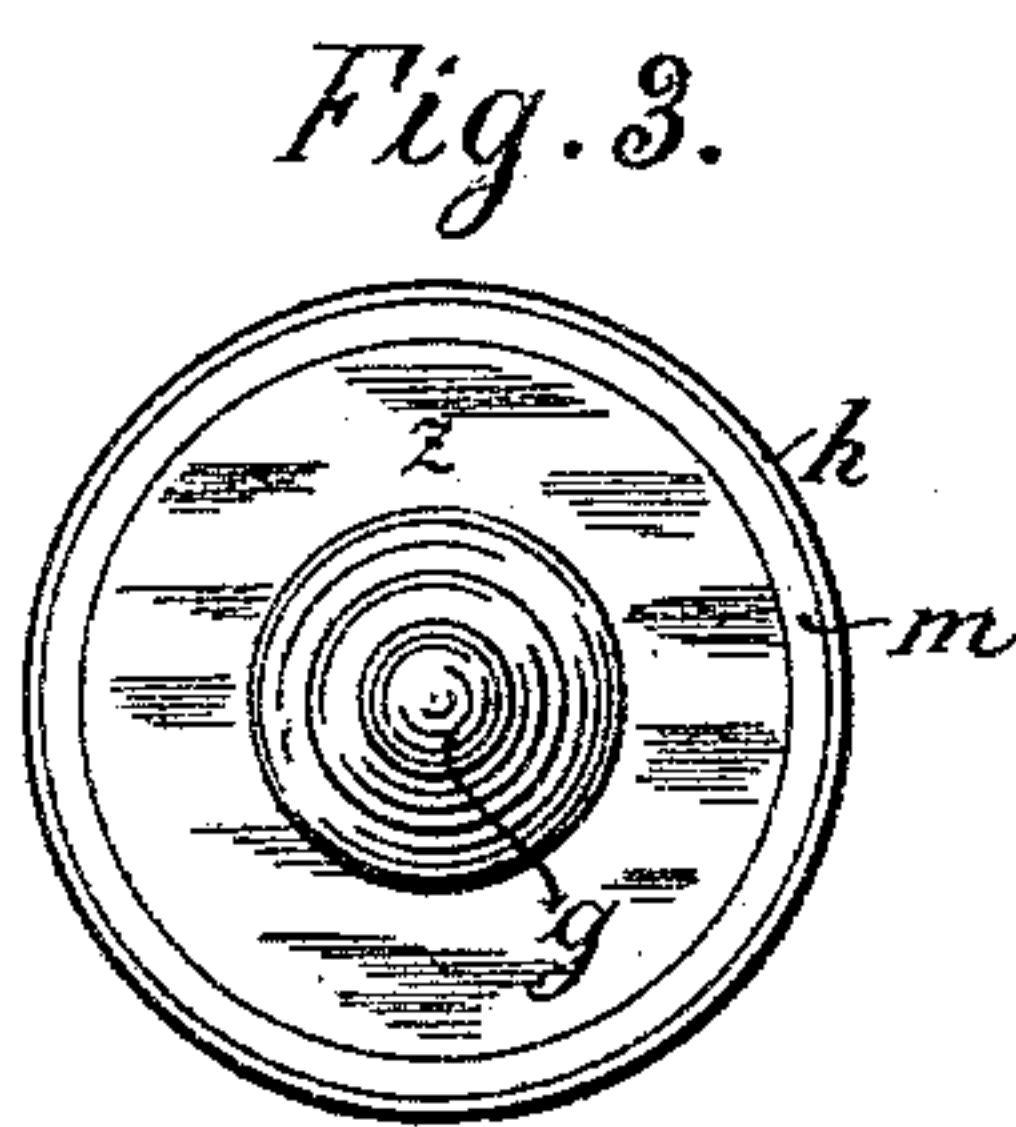
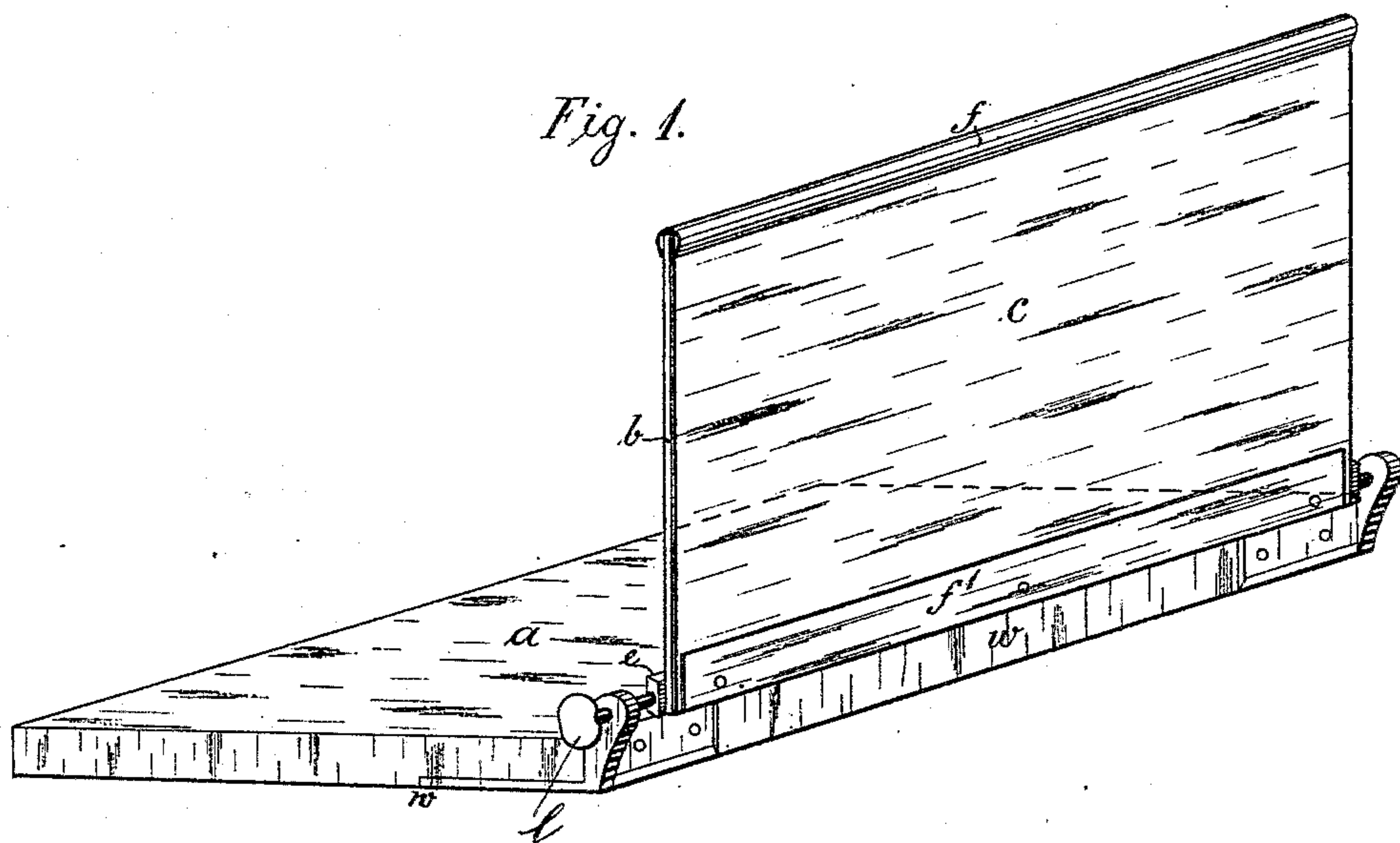
(No Model.)

2 Sheets—Sheet 1.

F. A. C. ZABEL.  
APPARATUS FOR COPYING WRITINGS.

No. 401,402.

Patented Apr. 16, 1889.



Witnesses,  
Anthony Steffen  
Wilhelm Vogt

Inventor.  
Franz Albert Carl Zabel  
By his Attorney  
Edwin A. Prager

(No Model.)

2 Sheets—Sheet 2.

F. A. C. ZABEL.  
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Fig. 4.

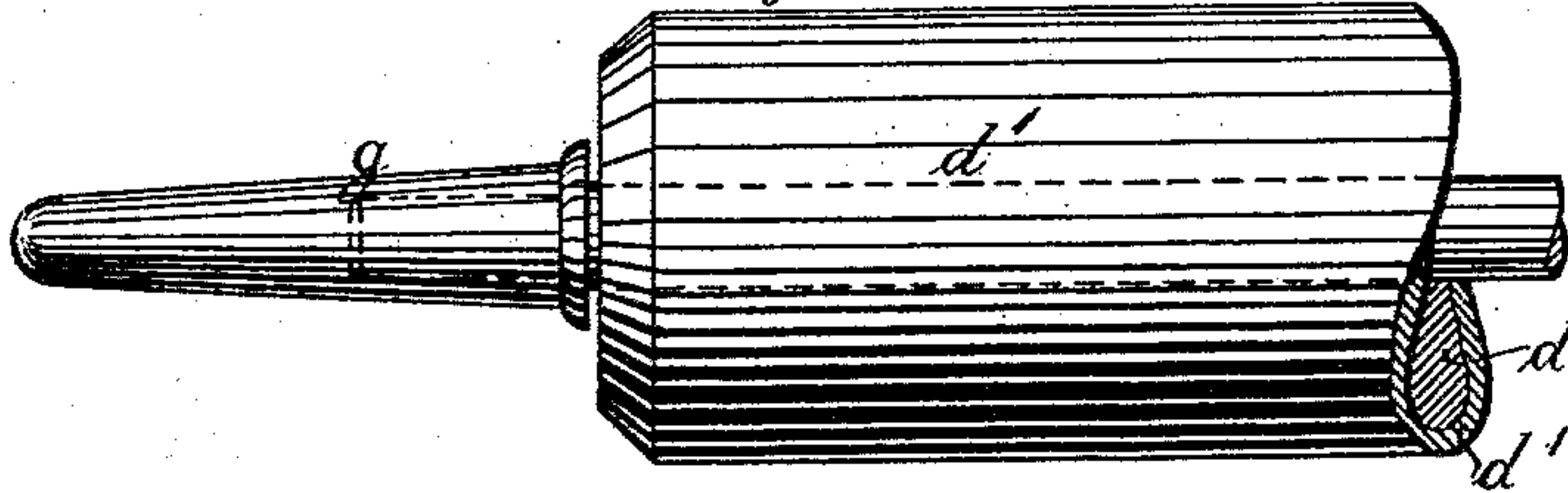


Fig. 5.

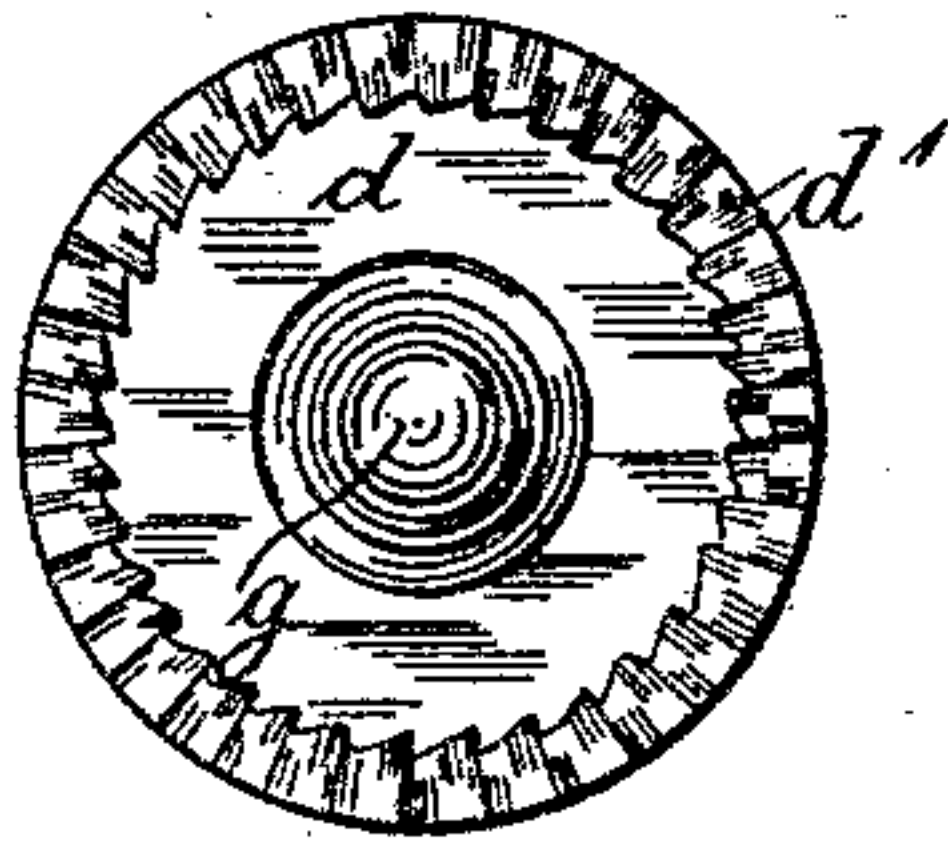


Fig. 6.

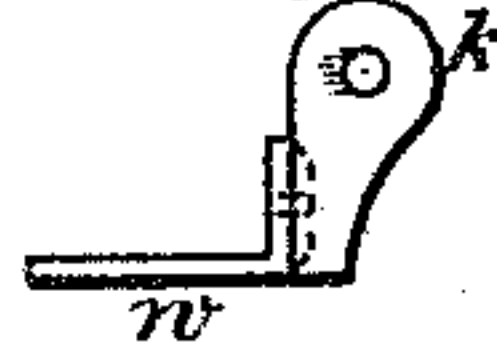


Fig. 7.

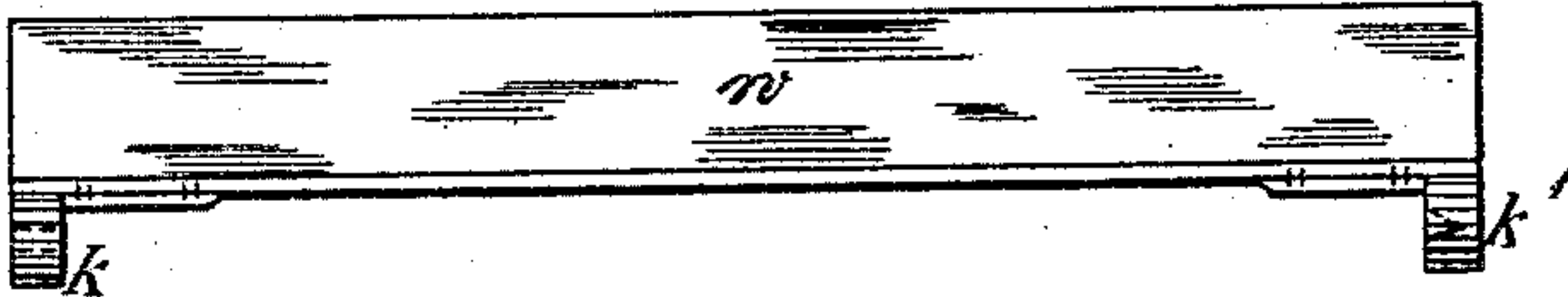


Fig. 9.

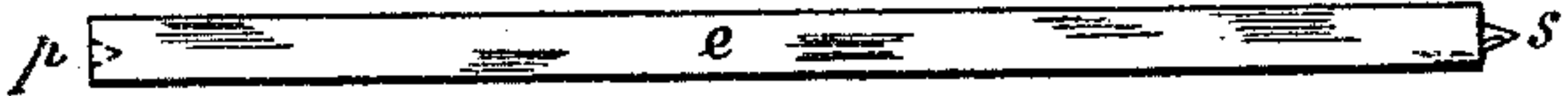


Fig. 10.



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# UNITED STATES PATENT OFFICE.

FRANZ ALBERT CARL ZABEL, OF INGOLSTADT, ASSIGNOR TO EULNER & LORENZ, OF HALLE-ON-THE-SAALE, PRUSSIA, GERMANY.

## APPARATUS FOR COPYING WRITINGS.

SPECIFICATION forming part of Letters Patent No. 401,402, dated April 16, 1889.

Application filed May 1, 1885. Serial No. 164,990. (No model.) Patented in Germany January 5, 1881, No. 14,775.

*To all whom it may concern:*

Be it known that I, FRANZ ALBERT CARL ZABEL, of the town of Ingolstadt, in the German Empire, have invented certain new and useful Improvements in Manifold-Copying Apparatus, (for which a German patent was granted to me bearing date the 5th day of January, 1881, No. 14,775,) of which the following is a specification.

My invention relates to improvements in manifold-copying apparatus for copying writing, drawings, and printed and other matter, the object of which said invention is to enable those otherwise unacquainted with the art to readily produce perfect indelible copies of writings, drawings, and printed or other matter in printing-ink and without the aid of expensive presses.

In order to carry my said invention into effect I employ a lithographic stone, such as is used in the well-known lithographic process, and provide this said lithographic stone with such devices, as subsequently described, that any person of ordinary intellect can readily manipulate the same and produce perfect copies of the matter to be reproduced; or instead of employing a lithographic stone a zinc plate, as used in the zincographic process, can be employed; but in order to make my said invention perfectly clear and distinct I will only describe the same with reference to the lithographic process, it being understood that zinc plates can be substituted for stone without departing from the tenor of my invention.

The main feature of my said invention is the transfer from the graphic surface by means of an elastic sheet which is composed of a backing of oil-cloth, stout canvas, paper, or other suitable material faced or covered with a thin layer of elastic material, such as is employed for making printers' rollers, of india-rubber, or an appropriate substitute for the same. This said sheet of elastic material is provided on both of its long edges with rails of sheet metal, which said metal is so folded or bent as to firmly embrace the edges of the said elastic sheet, while the upper and lower edges are left free, so that the said elastic or flexible sheet can readily adapt itself

to the surface of the stone or other material provided with or containing the matter to be reproduced. Although this said elastic or flexible sheet can be employed without being attached to the stone, plate, or other matter, still I have found it in the most cases preferable to attach the same in such manner that the same can be readily applied to the stone or plate, and so that the said elastic or flexible sheet can be repeatedly brought to bear on precisely the same spot or part or parts of the said stone or plate. For this purpose I attach a rail of suitable form to one of the sheet-metal rails fixed to the said elastic or flexible plate, which said rail is at the one end provided with a pointed tip or center which fits into a suitable bearing fixed to the lithographic stone or zincographic plate, and at the other end with a corresponding conical cavity or recess for receiving the point or tip of a screw working in a suitable bearing attached to the other end of the said stone or plate. It will be evident that when the elastic or flexible plate is so mounted the same will always come into contact with precisely the same part of the stone, and thus insure perfect manifold copies from the same original. In order to be able to produce these said copies it is necessary to employ special rollers, which also form a part of my said invention. In ordinary lithography the ink must be applied in a very thin layer on the stone or the same would be squeezed or pressed out in passing through the press, and thus produce imperfect prints; but according to my invention a thick layer of ink can be applied which is not absorbed by the elastic or flexible sheet in one operation, so that several transfers from the stone to the elastic plate can be carried out without reinking the said stone; and in order to be able to apply this said thick layer of ink I employ a wooden roller or cylinder with fixed or movable handles with a coating of about five millimeters or one-fifth inch in thickness of elastic mass—such as is generally employed for inking-rollers in printing-offices—which said layer of elastic material is covered with a thin india-rubber cylinder. Rollers made on this system will give off a much thicker layer of ink and much



quicker than the rollers generally used by lithographers, as the said rollers are much more elastic than when made of leather or entirely of india-rubber. For giving the requisite pressure for transferring the original from the stone to the elastic sheet and from the said elastic or flexible sheet to paper, I employ a hand-roller, of wood, and clad with felt, cloth, or other suitable material.

Figure 1 is a perspective view of my improved manifold-copying apparatus with the plate of elastic or flexible material turned half-back and held straight. Fig. 2 is a side elevation of the inking-roller, partly broken away to show the internal construction. Fig. 3 is an end view of the roller shown in Fig. 2; and Fig. 4 is a side elevation of the pressure-roller, partly broken away to show the internal construction. Fig. 5 is an end view of the same. Fig. 6 is an elevation of the rail of angle-iron attached to the lithographic stone and carrying the bearings for the point of the rod attached to the flexible or elastic sheet and the screw for holding the opposite end of the same. Fig. 7 is a top plan view of the same. Fig. 8 is an end elevation of the parts shown in Fig. 6. Fig. 9 is an elevation, and Fig. 10 a top view, of the rail attached to the elastic or flexible plate, in the position as represented in Fig. 1.

*a* is a lithographic stone; *b*, a sheet of elastic or flexible material.

*c* is the backing or protective covering to the same.

*e* is the rail attached to the said sheet and backing and to the lower sheet-metal stiffening-rail, *f*'.

*f f'* are two rails of sheet metal bent over so as to firmly embrace the edges of the elastic or flexible sheet *b c*.

*p* is a conical cavity in the one end of *e*, to receive the point of a thumb or other screw, *l*.

*s* is the pointed tip of the rail *e*, which is carried in a suitable bearing, *k'*, fixed to the angular rail *w* of the stone *a*.

*w* is a rail of angle-iron or other suitable material, which is fixed in appropriate manner to the lithographic stone *a*, and is provided with the bearings *k k'*, of which *k* is provided with a threaded boring to receive a suitable thumb-screw, while *k'* is provided with a conical cavity or recess to receive the tip or point *s* of the rail *e*.

*d*, Figs. 4 and 5, is the wooden cylinder of the pressure-roller; *d'*, the felt or cloth covering to the same, and *g* the handle to the said roller.

*z*, Figs. 2 and 3, is the wooden cylinder of the inking-roller; *m*, the covering of the same of elastic mass or composition; *h*, the external cylinder or cover of india-rubber.

*g* is one of the handles of the roller.

In order that my invention may be fully understood, I will proceed to describe the method in detail.

The matter to be printed or reproduced is

written or drawn on a lithographic stone with lithographic crayon or ink, in like manner as writing or drawing on paper—*i. e.*, not in reverse style—and the stone treated in like manner, as is customary in the ordinary lithographic process, and then inked. A thin sheet of elastic material, *b*, such as is used for making printers' rollers, india-rubber, or substitute for the same, which said thin sheet of elastic material is provided with a layer of paper, oil-cloth, or other suitable material, *c*, is now pressed onto the stone *a* by rolling a roller of suitable material over the oil-cloth or other layer, or otherwise pressing the said sheet onto the stone, and which, when removed from the stone, will be provided with a perfect negative of the writing or other matter on the lithographic stone *a*. The paper or other matter or material to be printed is now laid on the elastic sheet *b* above the matter, to be copied and pressed onto the same in appropriate manner, preferably by means of a hand-roller, *d*, covered with cloth, felt, or other suitable material, *d'*. On removing the paper from the elastic sheet *b* it will be found to contain a perfectly-sharp copy of the original writing, drawing, or other matter written on the lithographic stone *a*.

Sufficient ink will be found on the elastic plate *b* for giving a second copy, and if the printing-ink employed is of good quality even more copies can be taken. The stone is again provided with printing-ink, the same transferred as before, and the copies produced on paper, as above described, and so on until a sufficient number of copies are printed. The writing, drawing, or other matter thus transferred from the lithographic stone to the elastic sheet can be reproduced with like clearness on glass, porcelain, wood, fabric, metal, or other material on which printing can be effected, when the previously-prepared elastic copying-sheet is pressed onto such said surfaces, it being immaterial whether the same are even or bent or curved. If a zinc plate is employed, like good results can be obtained, and if positive types are used, (*i. e.*, types representing the positive of the negative types now employed,) and the words or other matter represented by the same is or are transferred to the elastic plate, excellent reproductions can also be obtained. In ordinary lithography the ink must be applied in a very thin layer on the stone, or the same would be squeezed or pressed out in passing through the press, and thus produce imperfect prints; but according to my improved process a thicker layer of ink can be employed, which is not absorbed in one operation by the elastic sheet, so that several transfers from the stone to the elastic plate can be carried out without reinking the said stone. The remaining traces of ink on the elastic sheet, which are too weak to give a proper impression, are removed by means of petroleum or other suitable equivalent. A thick layer of printing-ink can be deposited



on the stone by employing inking-rollers of the construction as aforescribed, and represented in Fig. 2.

5 Rollers made on this system will give off a much thicker layer of color and much quicker than the rollers generally used by lithographers, as the said rollers are much more elastic than when made of leather or entirely of india-rubber.

10 When the elastic sheet is connected to the stone in such manner that the same revolves around a suitable hinge, it is not necessary to remove the ink remaining on the elastic sheet after each printing by means of petroleum,  
15 as the sheet of elastic material will, on being again lowered onto the stone, occupy precisely the same position as before, so that any remnant of ink remaining on the elastic plate will mix with the fresh ink on the stone *a* or be  
20 covered by the same.

It is from the preceding evident that my said improved apparatus can be employed for carrying out all kinds of work pertaining to lithography, zincography, or letter-press  
25 printing without having recourse to expensive presses.

Having now described and ascertained the

nature of my said invention, what I claim, and desire to secure by Letters Patent, is—

1. A manifold-copying apparatus comprising a stone or plate to receive the matter to be copied, and a transfer-plate having an elastic front face and a backing of inelastic flexible material, substantially as described. 30

2. In a manifold-copying apparatus, the combination, with an impression stone or plate, of a transfer sheet or plate having an elastic front face and inelastic flexible backing, and side rails constituting a frame, substantially as described. 35

3. In a manifold-copying apparatus, the combination of the stone *a* with the sheet-metal piece *w*, the bearings *k k'*, and the impression-plate *c*, pivoted in said bearings, said plate having an elastic front face and an inelastic flexible backing, substantially as described. 40

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FRANZ ALBERT CARL ZABEL.

Witnesses:

ANTHONY STEFFEN,  
B. Roi.