No. 662,693. Patented Nov. 27, 1900.

A. KLEIN.

COPYING MACHINE.

(Application filed Dec. 22, 1899.)

(No Model.) 3 Sheets—Sheet 1.

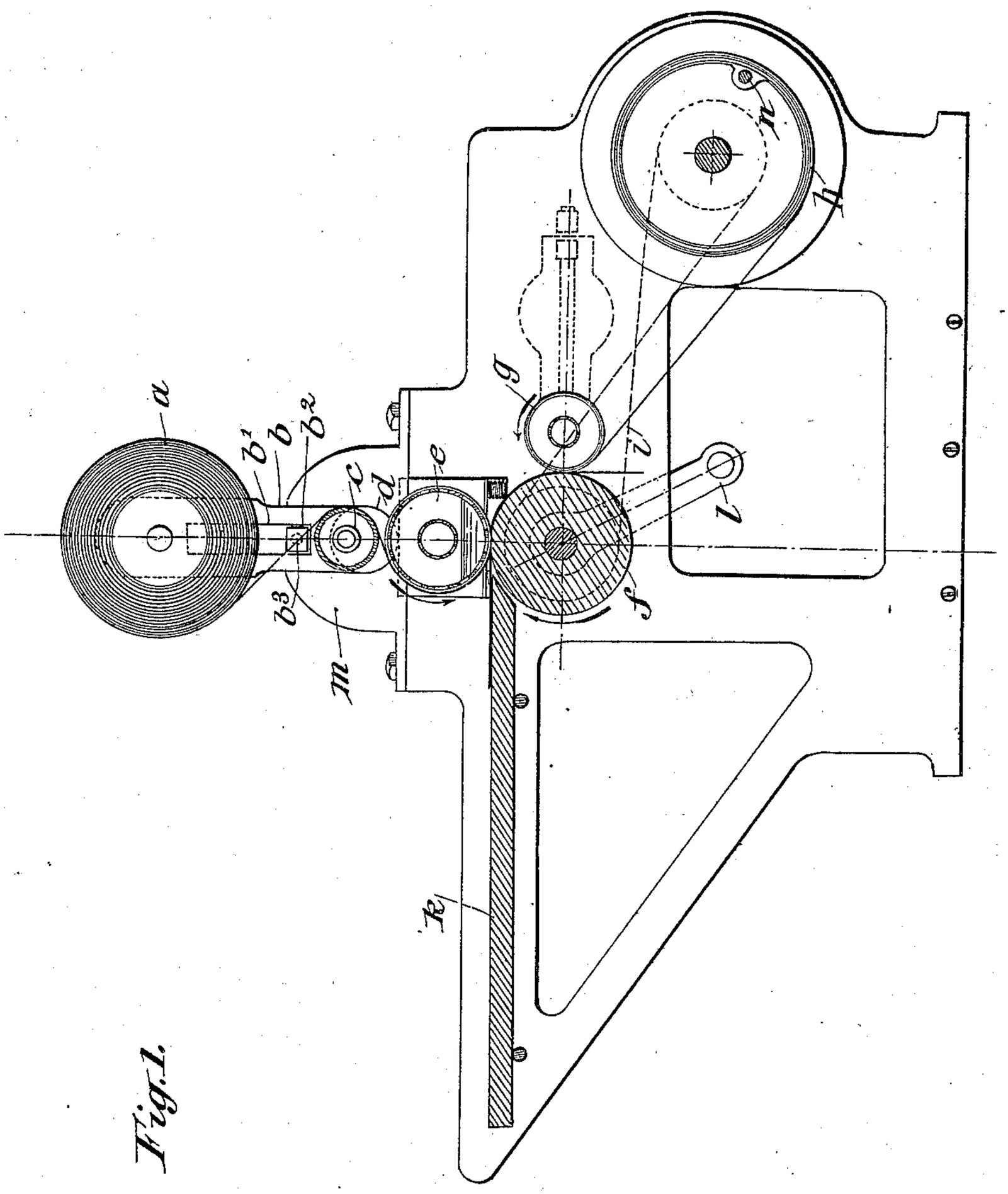

Fig. 1.

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J. Buehler

Inventor,
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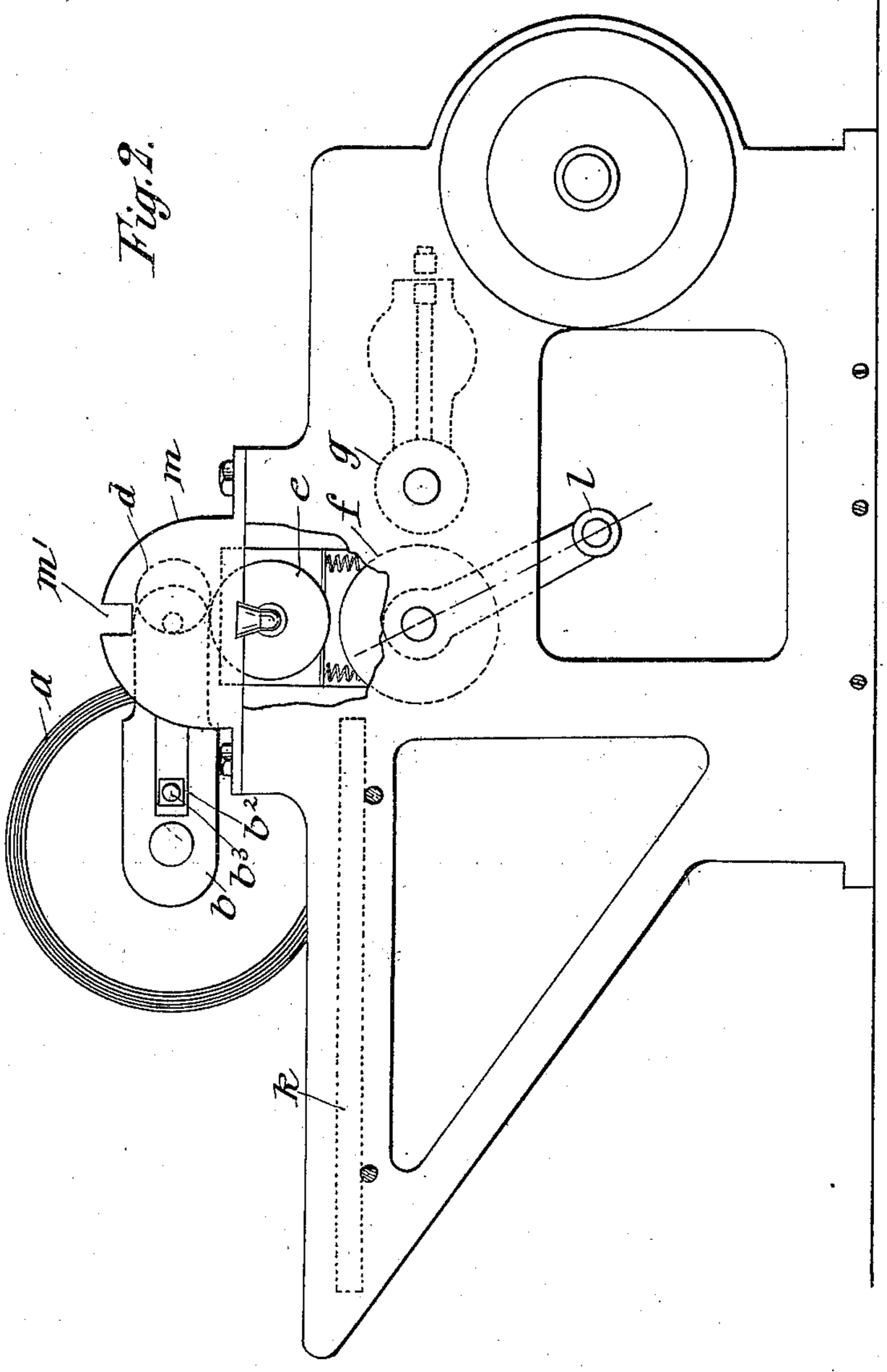
(No Model.) 3 Sheets—Sheet 2.

Fig. 2.



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(Application filed Dec. 22, 1899.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 3.

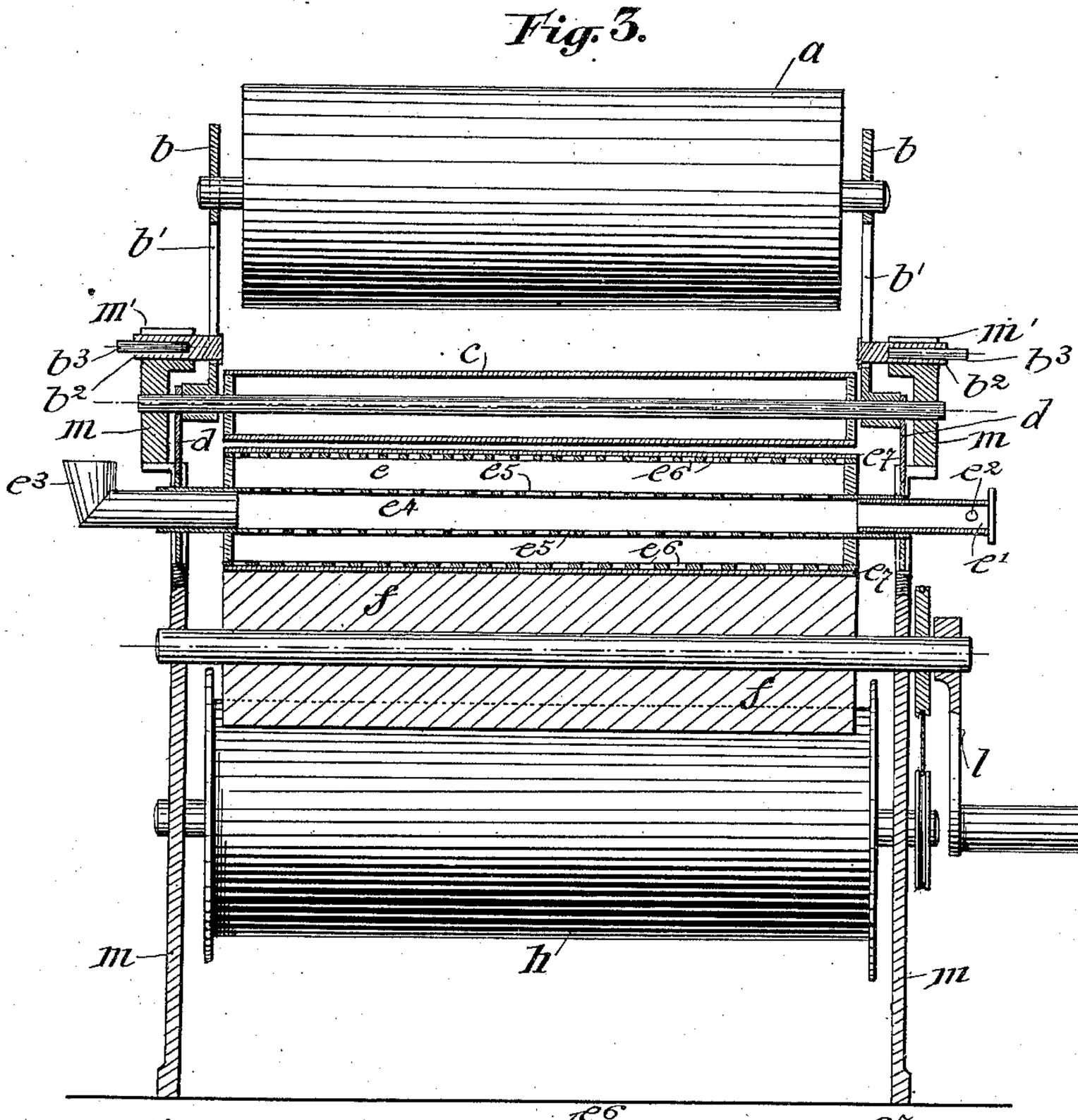

Fig. 4.

Witnesses:
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UNITED STATES PATENT OFFICE.

ADOLPH KLEIN, OF GROSS-LICHTERFELDE, GERMANY.

COPYING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 662,693, dated November 27, 1900.

Application filed December 22, 1899. Serial No. 741,307. (No model.)

To all whom it may concern:

Be it known that I, ADOLPH KLEIN, a subject of the German Emperor, and a resident of Gross-Lichterfelde, near Berlin, Germany, have invented certain new and useful Improvements in Copying-Machines, of which the following is a specification.

My present invention relates to copying-machines, the object being to provide an apparatus of this kind in which the copying-paper is moistened, by means of the upper roller, immediately during the compression of the pressure-rollers. Said upper roller is hollow, perforated, provided with porous or absorbent coating, and serves as a water-reservoir, which arrangement has the advantage that the copying-paper can never be moistened to too great extent, since the hollow perforated roller and its hollow perforated shaft are tightly closed at both ends, so that the porous or absorbent coating cannot receive too large an amount of water. The opening of a suitable valve enables the degree of moisture of said coating to be increased as may be required. The said arrangement has the further advantage that the machine may be transported from one place to another without the water flowing out therefrom, and it enables the dispensing with a moistening-roller and a separate water-reservoir on the one hand and a pressure-roller on the other hand. The writings to be copied are inserted under the copying-paper with the writing turned upward and drop downward after passing through the pressure-rollers and the drying-roller without any special device or needing work of the operator, while the paper bearing the copies and in still partially moistened condition is dried by means of a hollow roller provided with an absorbent coating and adapted to be heated in any convenient way, said paper being afterward rolled upon a disk roller. The unrolling and moistening of the copying-paper, the copying operation, drying, and winding of the copies are effected simultaneously and automatically by actuating a crank.

In the accompanying drawings, Figure 1 shows the improved machine in operation. Fig. 2 shows the same out of use. Fig. 3 represents the arrangement of the rollers. Fig. 4 represents the moistening pressure-roller serving as a water-reservoir.

The copying-paper roller *a* is journaled in the lever *b*, serving to throw the cam *d* into and out of engagement, and provided with slots *b'*. Said roller varies its position in accordance with the relative position of the pressure-rollers. When the pressure-rollers *e f* are set apart from each other—that is, when the upper roller is held out of engagement by depressing the lever *b*—the paper-roller *a* will be brought upon the plate *k*, while said roller is arranged parallel above the pressure-rollers after throwing the same into engagement. In order to prevent the continuous rotation and the weight of roller *a* from disengaging the cam *d* and separating the pressure-rollers during the operation of the machine, I have arranged in the slots *b'* of the eccentric rods *b* slide-blocks b^2, provided with clamps b^8 and engaging the slots *m'* in the frame *n* after the engagement of the rollers.

The paper unrolled from *a* passes over a feed-roller *c*, mounted upon the cam-shaft *d*, between the elastic drive-roller *f* and the hollow roller *e*, said paper being thus moved together with the writings to be copied placed upon the plate *k*. A hollow roller *g*, adapted to be heated by means of steam or any other suitable medium and provided with a coating of felt or like material, is in frictional engagement with the drive-roller *f*, so that the paper bearing the copies and partially moistened will be dried immediately after passing between the rollers *e f*, said paper being then rolled upon a disk roller *k*. The original after being copied falls down after passing between the said rollers *e f* and *f g*. By rotating the crank *l* in the direction of the arrow the paper will be unrolled and moistened and the copying operation, drying, and winding of the copies effected simultaneously.

The hollow pressure-roller *e*, serving to moisten the copying-paper and to contain water, is perforated and provided with a coating of absorbent material (felt) e^7. The shaft e^4 of the hollow roller *e* is also perforated, so as to permit of the easy introduction of water. Water is introduced by pouring it into

a suitable funnel e^3, Fig. 3, which may be removed after the inner space is filled with water, the corresponding opening being then tightly closed by means of a stopper made of cork, rubber, &c. In order to increase the flow of water into the absorbent cover or coating e^7 during the operation of the machine, I have provided a valve e' in one end of the shaft e^4, preferably in the end toward the handle or crank. When said cover is not sufficiently moistened, said valve is drawn outwardly until the opening e^2 therein is exposed, thereby permitting air to enter said opening and through the valve into the hollow shaft, whereby an increased flow of water through the openings in the roller and shaft is effected by the pressure of the air so admitted.

The drying-roller g, which is in frictional engagement with the drive-roller f, is coated with absorbent material—such as felt, &c.—and mounted upon a perforated shaft. The coating of the roller g has the advantage that the paper bearing the copies cannot be singed when the roller is too hot or when the machine is stopped. Furthermore, when it is desired to make a copy of a small number of letters only the heating of roller g may be dispensed with. Said roller may be removably mounted in any well-known manner.

The disk roller h is provided with rod n, circular in cross-section, edged in a suitable recess, and coated with yielding material, said rod serving to hold the end of the paper at the beginning of the winding. Said roller is actuated through the agency of a cord or equivalent i, passing over grooved pulleys secured to the rollers h and f, respectively, said pulleys being shown in dotted lines in Fig. 1.

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

1. In a copying-machine of the character described, the combination with the hollow pressure-roller e serving as a water-reservoir for moistening the copying-paper, of a paper-roller a, a cam d, a feed or guide roller mounted upon the shaft of said cam, an elastic drive-roller f, a hollow drying-roller g coated with absorbent material and adapted to be heated in any convenient manner, and a disk roller h for winding up the paper, provided with a retaining-rod n, substantially as set forth..

2. In the copying-machine of the character described, the combination with the paper-roller and the pressure-rollers, arranged so that the writings to be copied pass between the pressure-rollers with the face turned upward, of a drying-roller for drying the copies, in frictional engagement with one of said pressure-rollers, and means for heating said drying-roller, substantially as set forth.

3. In the copying-machine of the character set forth, the combination with the paper-roller a, journaled in the eccentric lever b, of said lever b, having slots b' therein, slide-blocks b^2 arranged in said slots and provided with clamps b^3, said slide-blocks engaging slots m' in the frame m of the machine, and a feed or guide roller mounted upon the shaft of the eccentric d, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

ADOLPH KLEIN.

Witnesses:

WOLDEMAR HAUPT,

WILLIAM MAYNER.