(No Model.) 3 Sheets—Sheet 1.

E. S. BRADFORD.

DIAL PRINTING MACHINE.

No. 424,851. Patented Apr. 1, 1890.

Fig. 1.

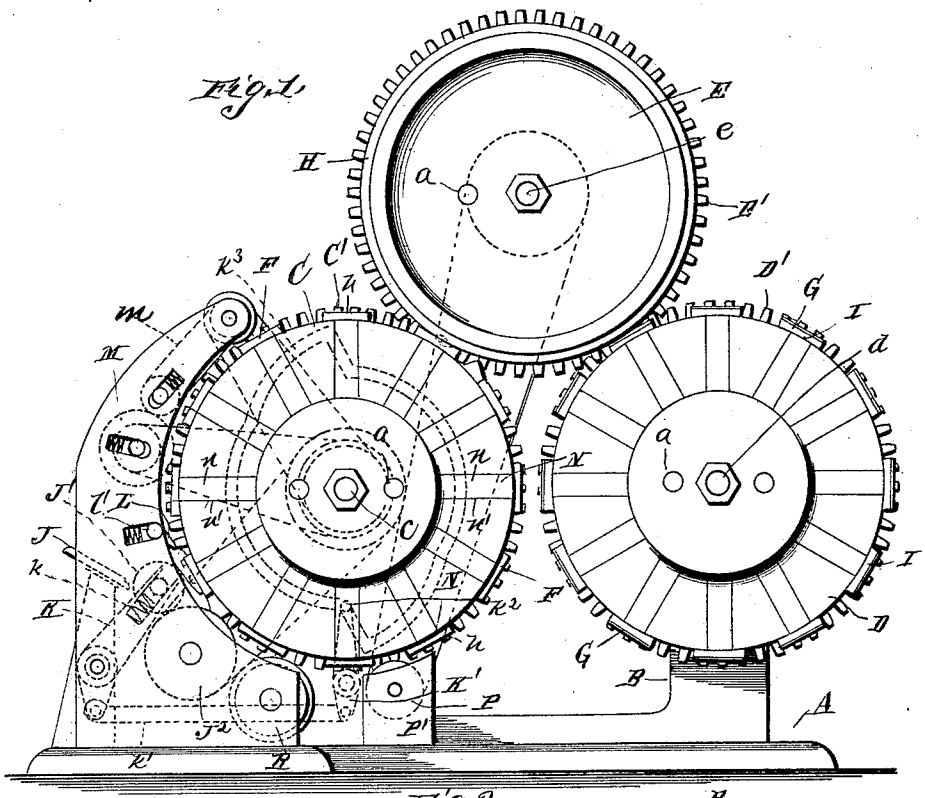
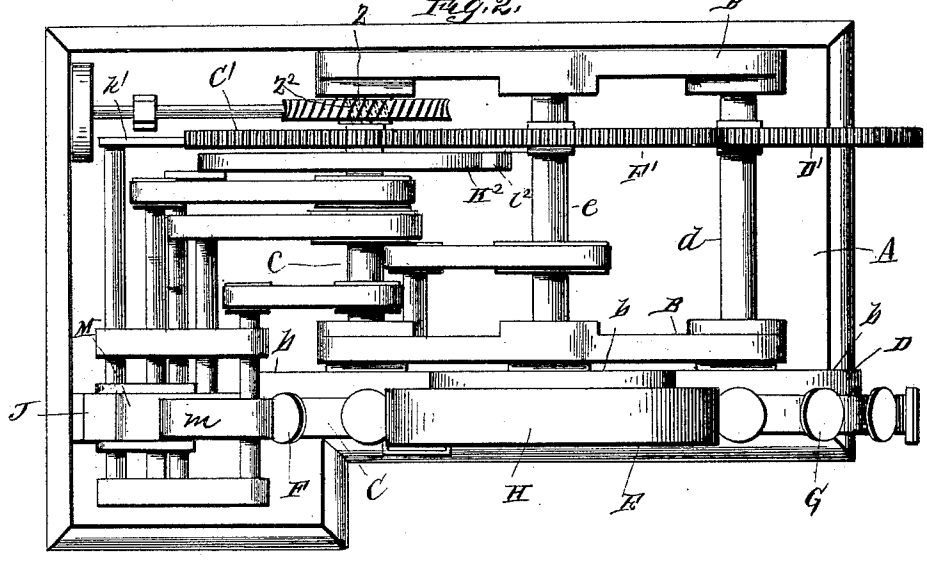


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

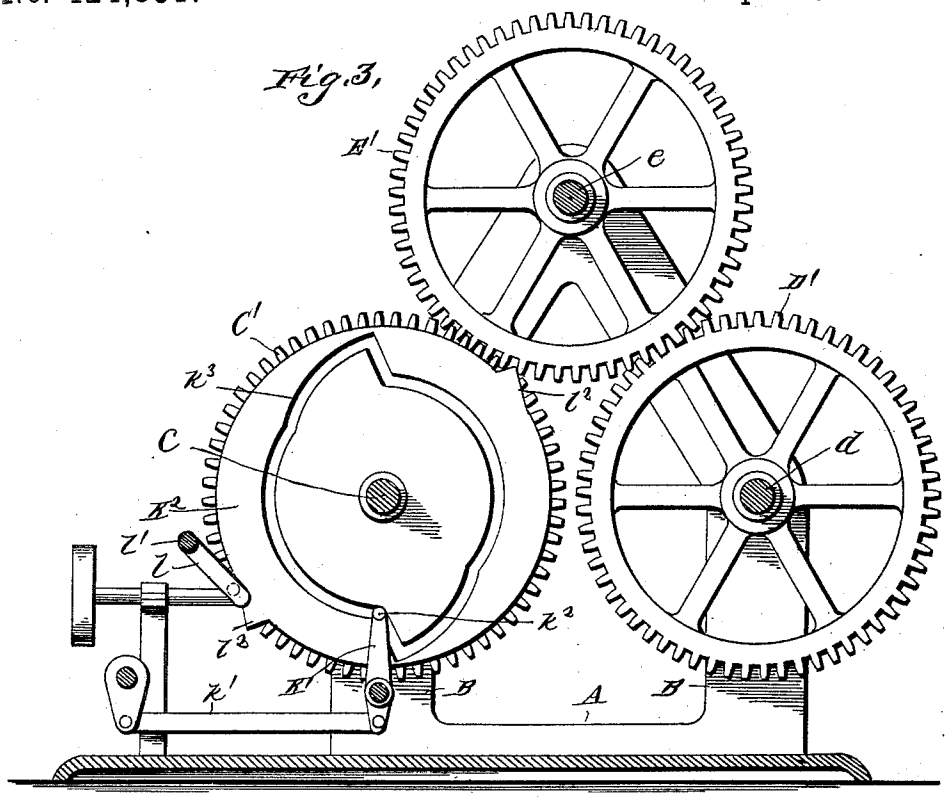
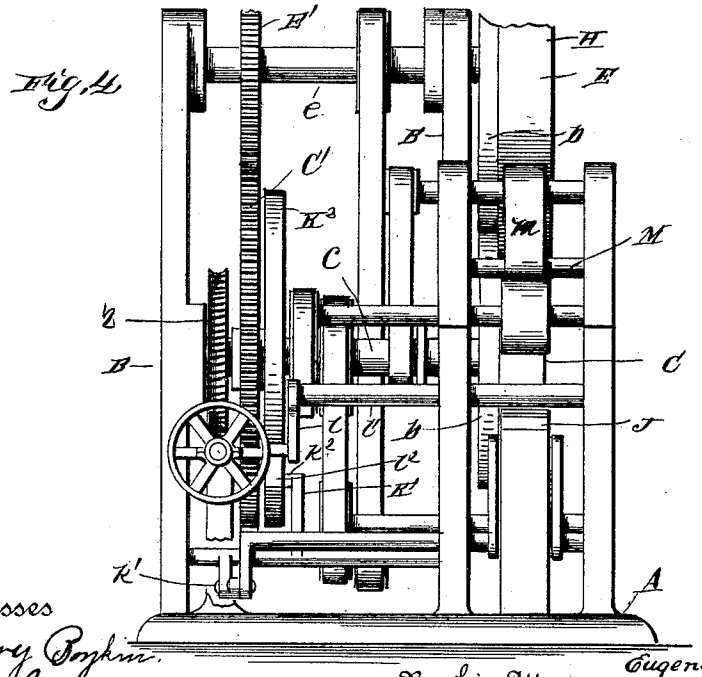


Fig. 4.



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E. S. BRADFORD.

DIAL PRINTING MACHINE.

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Fig. 5.

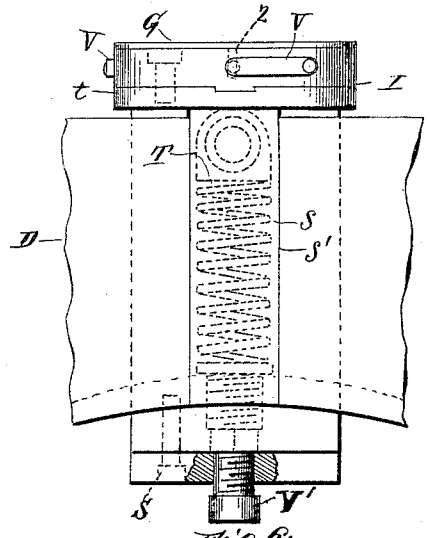


Fig. 6.

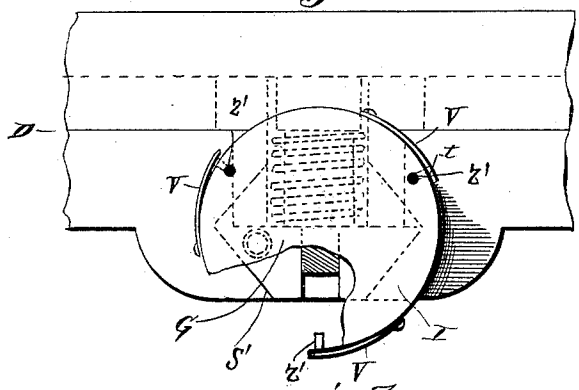
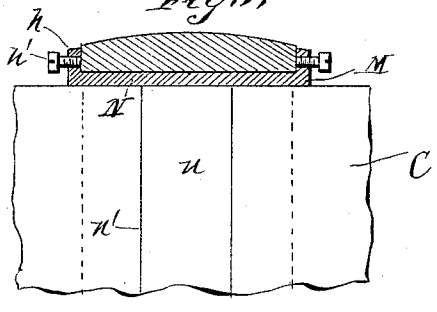


Fig. 7.



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UNITED STATES PATENT OFFICE.

EUGENE S. BRADFORD, OF SPRINGFIELD, ILLINOIS.

DIAL-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 424,851, dated April 1, 1890.

Application filed March 18, 1889. Serial No. 303,708. (No model.)

To all whom it may concern:

Be it known that I, EUGENE S. BRADFORD, a citizen of the United States, and a resident of Springfield, in the county of Sangamon and State of Illinois, have invented certain new and useful Improvements in Dial-Printing Machines; and I do 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, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a side elevation. Fig. 2 is a top plan view. Fig. 3 is a vertical longitudinal section. Fig. 4 is an end view, and Figs. 5, 6, and 7 are detail views.

The object of the invention is to provide a machine of simple construction and exact operation, whereby dials can be printed in continuous succession and with great rapidity.

In the accompanying drawings I have illustrated a machine embodying the invention, in which the letter A designates the base, and B the pillars or arms of the framing rising therefrom, and providing the bearings for the shafts and journals.

C indicates the disk carrying the dies on its periphery and mounted on the shaft *c*, and D the disk to which the dials are attached by means of periphery-holders, and from which they are taken when printed, this disk being mounted on the shaft *d*. An intermediate disk E on a shaft *e* is designed to take the impression from the dies F of the disk C and to transfer these impressions to the dials G on the disk D. The shafts of the disk are provided with the gear-wheels C′ D′ E′, which are engaged in train and are of the same diameter and pitch, the radius of the pitch-line being equal to the distance from the center of the disk to the face of the die, or to the face of the transmitter, or to the face of the dial at the point of contact.

The die wheel or disk C being rotated by motion communicated to the pinion Z on its shaft, the transmitter-disk E and the dial-wheel D are turned also, their motion being even and uniform with that of the die-wheel C.

By means of proper inking and cleaning devices, as hereinafter described, the dies F which are engaged are inked and prepared to deliver the dial-markings to the peripheral rubber or elastic transfer rim or face H of the transfer-disk E, which conveys the markings to and prints the same on the dials G as they are presented in succession to said transfer-disk and are carried around by the disk D in contact therewith. As the dials come over on the disk D after being printed, they are taken from the holders I of said disk by the attendant, blank dials being attached to said holders in place thereof, so that the operation is continuously carried on.

To provide for dials of different size, the disks C, D, and E are usually made removable, being easily adjusted to proper position on their shafts by means of the guide-pins *a* of the back plates *b*.

J indicates an ink-feeding plate secured to the frame, and J′ is the ink-feeding roller, the journals of which are held in the end bearings of the lever K by the springs *k*. The lever K is pivoted to a fulcrum-pin on the frame and is connected by a rod *k*′ to a lever K′, bearing a stud k^2, which engages a cam-groove k^3 of the cam-wheel K″ on the shaft *c*. At opposite points of its diameter the cam-groove is provided with angular bends, whereby the lever K′ is moved, this movement operating the connection *k*′ to move the lever K and vibrate the ink-feeding roller back upon the inking-plate and forward again to its proper position for transferring the ink to the main inking-roller J″, by which the ink is delivered to the convex faces of the dies, filling the groovings thereof.

L indicates an adjustable angularly-placed knife or cleaner, which has its journals in spring-bearings to facilitate its automatic adjustment to the surface of the die as the latter passes under its edge. The object of the cleaner is to remove superfluous ink from the face of the die, while leaving that in the groovings. The position of the edge of the knife is governed by an arm *l* of its shaft *l*′, which travels upon a disk K″ of proper diameter, having the angular cam projections *l*″, which are at diametrically-opposite points, and are designed to throw the knife back at certain times against the ink-feeding roller, to which the ink taken by the knife from the faces of the dies is delivered.

To further insure the perfect cleaning of the faces of the dies, the cleaning-roller M is provided next to the knife, this roller being itself cleaned by the short belt *m*, of felting, which is kept charged with alcohol or turpentine. The dies passing the cleaning-roller are cleaned upon their faces, while the ink is left in the engraved groovings, which are thus enabled to deliver their impressions in a clear and clean manner to the transfer-disk E. The dies are secured to adjustable heads *h* of the die-holders N, whose shanks *n* are seated in grooves or ways *n'* of the disk C. The heads *h* are adjustable in the direction of movement of the disk, the head and body of the die-holder having a tongue-and-groove joint, as indicated. A clamp-screw is indicated at *h'*.

The dials are attached to the adjustable heads *t* of the holders I, whose shanks *s* are seated in grooves or ways *s'* of the disk D. These heads *t* are adjustable transversely to the direction of movement of the disk, the head and body of the dial-holder having also a tongue-and-groove joint.

The disk-holder is designed to have some spring action, because the faces of the dials of watches are plane and the holders must yield as the transmitter-disk engages them. The tension-spring is indicated at T, and V' is the tension-screw which engages a threaded opening in a shoulder of the disk and forms the bearing for the inner end of this spring. A stop-screw S in a holder is designed to be adjusted to limit the movement of the holder outward, while the spring T regulates its yielding tension.

Watch-dials are usually prepared with three studs *z*, and to facilitate the attachment of these dials to the head of the dial-holder in precise and exact position said head is provided with three sockets, as at *z'*, to receive the studs *z*, and spring-fastenings V, attached to the head, serve to engage the studs in said sockets and to hold them by friction. The dials can therefore be readily placed in attached position on the heads of the dial-holders and easily detached therefrom when printed by the operator.

A revolving brush P in an alcohol or turpentine cup P' serves to clean the dies after their work, and the alcohol or turpentine is removed therefrom by the felt-covered roll R, which is operated by the pressure of the dies.

The inking-roller is operated by a belt from a drum on the shaft of the die-wheel, and from another drum on the same shaft a belt extends, engaging the driving-pulley of the belt *m*. The cleaning-brush P is rotated by a belt from a drum on the shaft of the transfer-disk E.

The main shaft *c* carries a pinion Z, which engages a worm Z'', whereby the mechanism is moved.

The main disks C, D, and E and the cleaning-rolls and inking devices are preferably arranged to move in the vertical plane. The attendant at the dial-wheel as it revolves toward him takes off the printed dials and attaches the blank to be printed.

In this machine the transmitter, being located between the die-wheel and the dial-wheel and moving evenly and uniformly with these wheels, takes the impressions from the dies and prints them neatly upon the dials. The adjusting devices enable the dies and dials to be properly placed and centered relatively to each other, so that the work done upon the dials will be clear and exact. The curvature of the face of the transmitter-disk is designed to have its radius equal to that of the pitch-line of the gear, so that there will be no slip, and the impressions upon the dials will not be blurred, but will be sharp and clear. The cleaning devices are designed to prevent any ink spots or marks from being presented to the face of the transmitter-disk, except those of the engraved groovings, in order that the work upon the dials shall be clean.

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

1. In a dial-printing machine, the combination of the revolving die-carrying disk, the revolving dial-carrying disk, the spring dial-holders of the latter, the intermediate transfer-disk, and the connecting-gear having uniform diameter and pitch, substantially as specified.

2. In a dial-printing machine, the combination, with the die-carrying disk and its engraved dies, the transfer-disk, the dial-carrying disk, and its spring dial-holders, of the equal gear-wheels on the shafts of said disks connected in train, the spring-adjusted cleaning-knife, and the inking and cleaning devices, substantially as specified.

3. In a dial-printing machine, the combination, with the die-carrying disk and its peripheral dies, the transfer-disk, and its elastic rim or face, of the dial-carrying disk, its peripheral dial-holders, and the connecting-gear of said disks, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

EUGENE S. BRADFORD.

Witnesses:
JOHN T. MARSH,
LAWRENCE LAMB.