(No Model.) 2 Sheets—Sheet 1.

# G. K. BIRGE.

## ROUTING MACHINE.

No. 360,081. Patented Mar. 29, 1887.

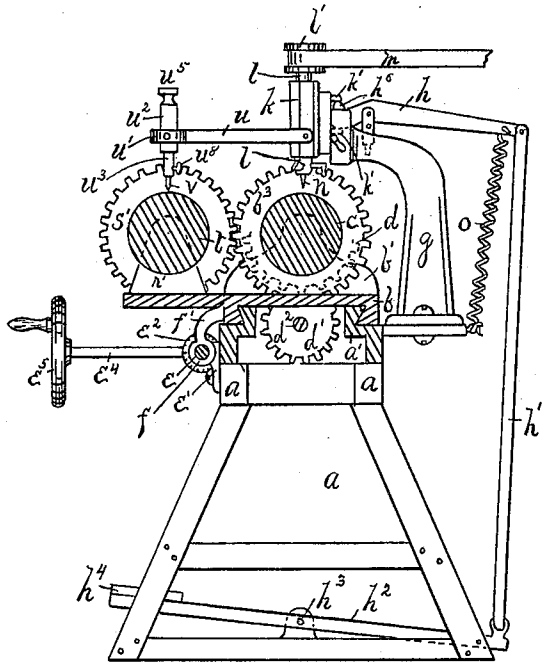

Fig. 1.

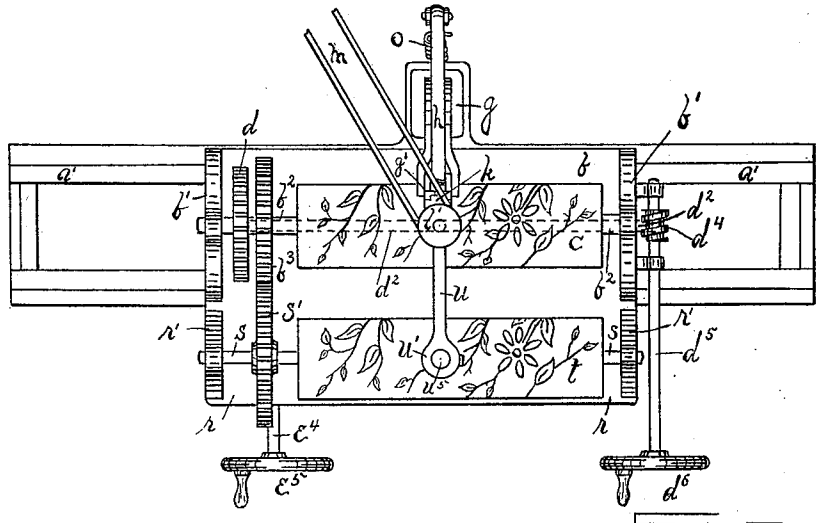

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

# G. K. BIRGE.

## ROUTING MACHINE.

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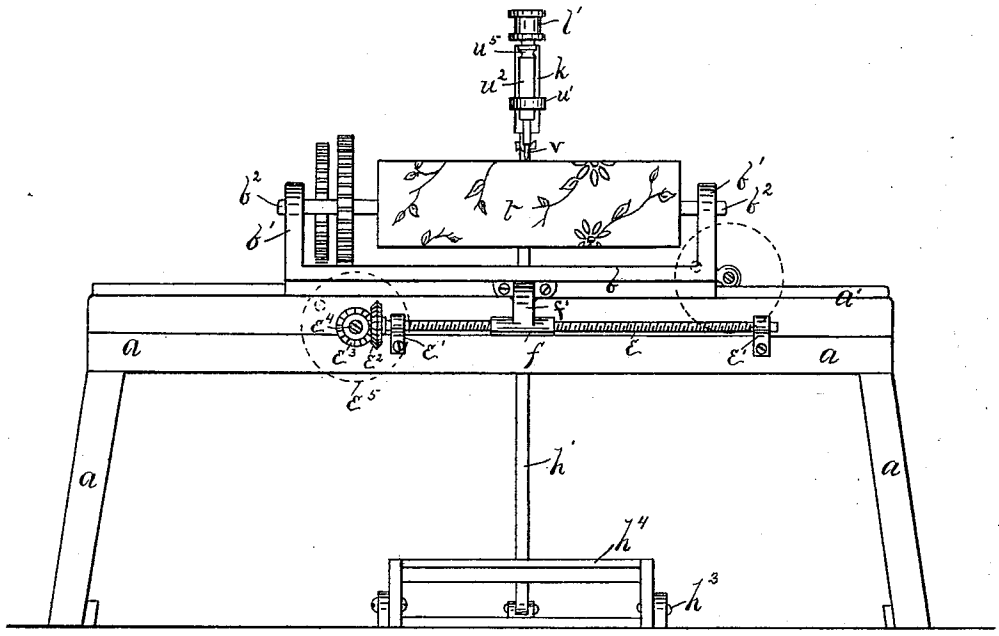

Fig. 3.

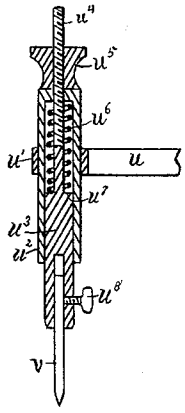

Fig. 5.

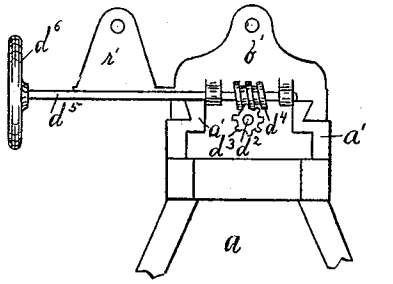

Fig. 4.

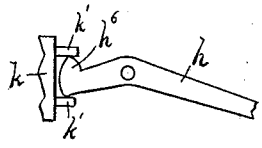

Fig. 6.

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# UNITED STATES PATENT OFFICE.

GEORGE K. BIRGE, OF BUFFALO, NEW YORK.

## ROUTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 360,081, dated March 29, 1887.

Application filed March 17, 1886. Serial No. 195,504. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE K. BIRGE, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Routing-Machines; 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates particularly to a special combination and arrangement of mechanical devices to form a routing-machine adapted for a special purpose—viz., that of mechanically producing a pattern upon the print-rollers (usually of wood) employed in the manufacture of wall-paper. These print-rollers are cylindrical in form, and the raised pattern thereon has heretofore been produced by hand-cutting.

The object of my invention is to do away with this slow hand-manipulation; and to that end it consists of a carriage or table adapted to receive the print-roller to be operated upon, upon which the pattern has been previously painted or outlined, the roller having a rotary motion thereon and the carriage or table a motion in the direction of the length of the print-roller, both of which motions being controlled entirely by hand, and a drill or routing-tool having a controlled motion to and from the print-roller.

My invention further consists in a pantographic arrangement, in combination with the above-outlined mechanism, by means of which it is not necessary to paint or outline the pattern upon the print-roller being cut, all as will be more fully hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation, partly in section, Fig. 2 is a top plan view, Fig. 3 is a front elevation, and Fig. 4 is a partial end elevation, of my improved device; and Figs. 5 and 6 are detached detail views.

Referring to the drawings, *a* is the frame-work upon which the operating mechanism is mounted. Across its upper portion is the tenoned bed *a'*, upon which is mounted the mortised table or carriage *b*. Upon this carriage *b*, at either end and immediately over the bed *a'*, are the end standards, *b' b'*, in which is mounted the axle $b^2$. This axle $b^2$ is adapted to receive and carry the print-roller *c* which is to be operated upon. *d* is a gear-wheel mounted upon the shaft $b^2$, and which intermeshes with the gear-wheel *d'* upon the shaft $d^2$ underneath the carriage *b*. At the other end of this shaft $d^2$ is the worm-wheel $d^3$, which intermeshes with the endless screw or worm $d^4$ upon the shaft $d^5$, at right angles to shaft $d^2$. This shaft $d^5$ extends out to a point in front of the machine, convenient for the operator, and has the hand-wheel $d^6$, by means of which the roller *c* upon the carriage *b* is revolved back and forth, as desired, at the will of the operator.

The horizontal movement of the carriage *b* in the direction of the length of the print-roller, back and forth upon its bed *a'*, is accomplished as follows:

*e* is a screw-threaded rod mounted loosely in brackets *e' e'* at the front of the frame *a*. At the left-hand end of this rod *d* is the bevel-gear $e^2$, which intermeshes with the bevel-gear $e^3$ upon the shaft $e^4$, at the outer end of which, and within easy reach of the operator, is the hand-wheel $e^5$. Surrounding the screw-threaded rod *e* is the screw-threaded collar *f*, which is rigidly connected to the front side of the carriage *b* by the bracket *f'*.

It will be seen that by turning the hand-wheel $e^5$ the screw-threaded rod *e* may be revolved either way in its bearings, and when so revolved the collar *f* will be correspondingly moved back or forth thereon, thus giving to the attached carriage *b* and roller *c* the desired horizontal motion.

Having outlined the mechanism for giving to the print-roller the two motions, rotary and in the direction of the length of the print-roller in both directions, which are controlled by the hand and eye of the operator, I will now proceed to describe the construction and operation of the cutting-drill and pantographic arrangement, in which *g* is a curved standard rigidly secured to the frame-work, in the upper portion of which is pivoted the lever *h*. At the rear end of this lever *h* is pivoted the pitman *h'*, its lower end being pivoted to the outer end of the foot-lever $h^2$, pivoted at $h^3$, and

having the foot-rest $h^1$ at its front end. The inner face of the standard $g$ is mortised, as at $g'$, to receive the tenoned socket $k$.

The tenoned portion of the socket $k$ is provided with the two lugs or spurs, $k'$ $k'$, between which the shouldered inner end, $h^6$, of the lever $h$ rests. (See Fig. 6.) The socket $k$ is apertured vertically to receive the drill-holder $l$, in which it is caused to rapidly revolve by the belt $m$ passing around the pulley $l'$ upon the upper end of the drill-holder $l$. In the lower end of the drill-holder is removably secured the drill or routing-tool $n$. The spring $o$, secured to the frame-work at one end and at the other to the outer end of lever $h$, keeps the drill or routing-tool $n$ normally away from the roller, and when it is desired to cut the roller the drill or routing-tool is pressed against the roller by means of the foot-lever or treadle $h^2$, and intervening mechanism described, the inner end of lever $h$ pressing against the lower lug, $k'$. When the foot is removed from the treadle, the spring $o$ pulls down the outer end of lever $h$, causing the inner end to raise the socket $k$ by means of the upper lug, $k'$.

With the mechanism already described, the roller $c$ to be operated upon is prepared by having the pattern painted or traced directly upon its cylindrical surface. The portion of the roller $c$ to be cut away by the drill or routing-tool is brought under the drill by manipulating the hand-wheels $e^5$ and $d^6$, which enables the operator to thus present any part of the roller to the action of the drill. By forcing down the drill or routing-tool, which is being rapidly revolved by the belt $m$, the cutting is accomplished, the design being to cut away with the drill or routing-tool the unpainted portions of the surface of the roller, thus leaving the pattern in relief, and the drill being arranged, as shown, it is always perpendicular to the axis of the roller or to the tangent plane at the point of contact of the drill with the roller.

In order to produce the pattern upon the roller $c$ without previously painting or tracing the pattern thereon, which involves considerable time, I have attached the following pantographic arrangement:

The carriage $b$ has the overhanging extension $r$, with the end standards, $r'$ $r'$, in which is mounted the axle $s$. The cog-wheel $s'$, upon the axle $s$, intermeshes with the cog-wheel $b^3$ upon the axle $b^2$, which in turning causes the axle $s$ to revolve, and with it the auxiliary roller $t$, rigidly encircling such shaft, and the cog-wheels $s'$ and $b^3$ being of the same diameter, the two rollers $c$ and $t$ revolve at a uniform rate of speed.

The design of the pattern to be cut upon the roller $c$ is to be drawn upon a piece of paper or cloth of a size to accurately fit and cover the auxiliary roller $t$, upon which it is to be securely attached in any suitable manner, the surface of the roller $c$ being left untouched.

$u$ is an arm rigidly secured at its inner end to the sliding socket $k$, its outer end being provided wih a ring, $u'$, for the reception of the socket $u^2$. This socket $u^2$ is recessed centrally and vertically to receive the pencil-holder $w^3$, (see Fig. 5,) its smaller upper portion, $w^4$, being screw-threaded and passing up loosely through the top of the socket $u^2$, its lower portion fitting snugly but loosely in the lower portion of the recessed socket. A screw-threaded cap, $w^5$, with milled edge, is engaged with the screw-threaded portion $w^4$ of the pencil-holder, and within the recessed socket and surrounding the upper portion of the pencil-holder is the spiral spring $w^6$, its lower end pressing against the shoulder $w^7$ of the holder. In a socket in the lower end of the holder $w^3$ is secured, by thumb-screw $w^8$, a pencil-point, $v$, which is adjustable in such socket. By turning the cap $w^5$ the holder $w^3$ can be raised or lowered to adjust the pencil to different-sized rollers, and different-sized pencils can be secured in the lower socketed end of the holder $w^3$ to correspond with different-sized drills in the machine.

With this construction the operator, by means of the hand-wheels $e^5$ and $d^6$, can readily and accurately cause the pencil-point to traverse the outlines of the design upon the roller $t$, which will at the same time cause the drill or routing-tool $n$ to cut away the proper surface upon the unmarked roller $c$, leaving in relief upon that roller an exact reverse copy of the pattern upon the auxiliary roller $t$.

While my improved machine is shown especially adapted for cutting print-rollers for wall-paper, it is apparent that it is also adapted for other analogous purposes—cylinders for calico printing and all carving upon cylindrical surfaces of either wood or metal.

The revolving drill or routing-tool might, by means of suitable mechanism, be given a horizontal motion in either direction, instead of the print-roller, which would then only have the rotary motion in both directions, the horizontal motion of the drill or routing-tool being controlled by hand, substantially as the carriage carrying the print-roller now is, the same result being accomplished in either event; or the revolving drill or routing-tool might be made stationary with respect to the print-roller and the print-roller moved to and from the routing-tool by mechanism controlled by the operator.

I claim—

1. A routing-machine for cutting patterns upon print-rollers, &c., consisting of a carriage adapted to receive the print-roller to be operated upon, mechanism controlled by hand to give a motion in the direction of the length of the print-roller to the carriage and a rotary motion to the roller in both directions, and a revolving drill or routing-tool adjustable to and from the roller, substantially as shown and described.

2. A routing-machine for cutting patterns upon print-rollers, consisting of a carriage

adapted to receive the print-roller to be operated upon and an auxiliary roller adapted to receive the design of the pattern to be cut upon the print-roller, mechanism controlled by hand to give a motion in the direction of the length of the print-roller to the carriage and a rotary motion to the rollers in both directions, a revolving drill or routing-tool adjustable to and from the print-roller, and a pencil adjustable to and from the auxiliary roller, substantially as and for the purpose stated.

3. In a routing-machine for cutting patterns upon print-rollers, the combination, with the print-roller *c*, mounted upon the axle $b^2$, having a rotary motion in either direction, controlled by the hand-wheel $d^6$, operating the intervening mechanism, as shown, and the carriage *b*, in which the axle $b^2$ is mounted, such carriage having a motion in the direction of the length of the print-roller in either direction upon its bed, controlled by the hand-wheel $e^5$, operating the intervening mechanism, as shown, of the revolving drill or routing-tool *n*, adjustable to and from the roller *c* in a line perpendicular to its axis by means of the foot-lever $h^2$ and intervening mechanism, substantially as shown and described.

4. In a routing-machine for cutting patterns upon print-rollers, the combination, with the print-roller *c* and auxiliary design-roller *t*, mounted upon the axles $b^2$ and *s*, having a rotary motion in either direction, controlled by the hand-wheel $d^6$, operating the intervening mechanism, as shown, and the carriage *b*, in which the axles $b^2$ and *s* are mounted, such carriage having a motion in the direction of the length of the print-roller in either direction upon its bed, controlled by the hand-wheel $e^5$, operating the intervening mechanism, as shown, of the revolving drill *n* and pencil-point *v*, adjustable to and from the rollers *c* and *t*, respectively, in a line perpendicular to their axes by means of the foot-lever $h^2$ and intervening mechanism, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE K. BIRGE.

Witnesses:
A. B. HUMPHREY,
W. T. MILLER.