Sept. 10, 1940. G. B. BOEHLE 2,214,450

MULTIPLE-REPEAT ROUTER

Filed April 17, 1939 3 Sheets-Sheet 1

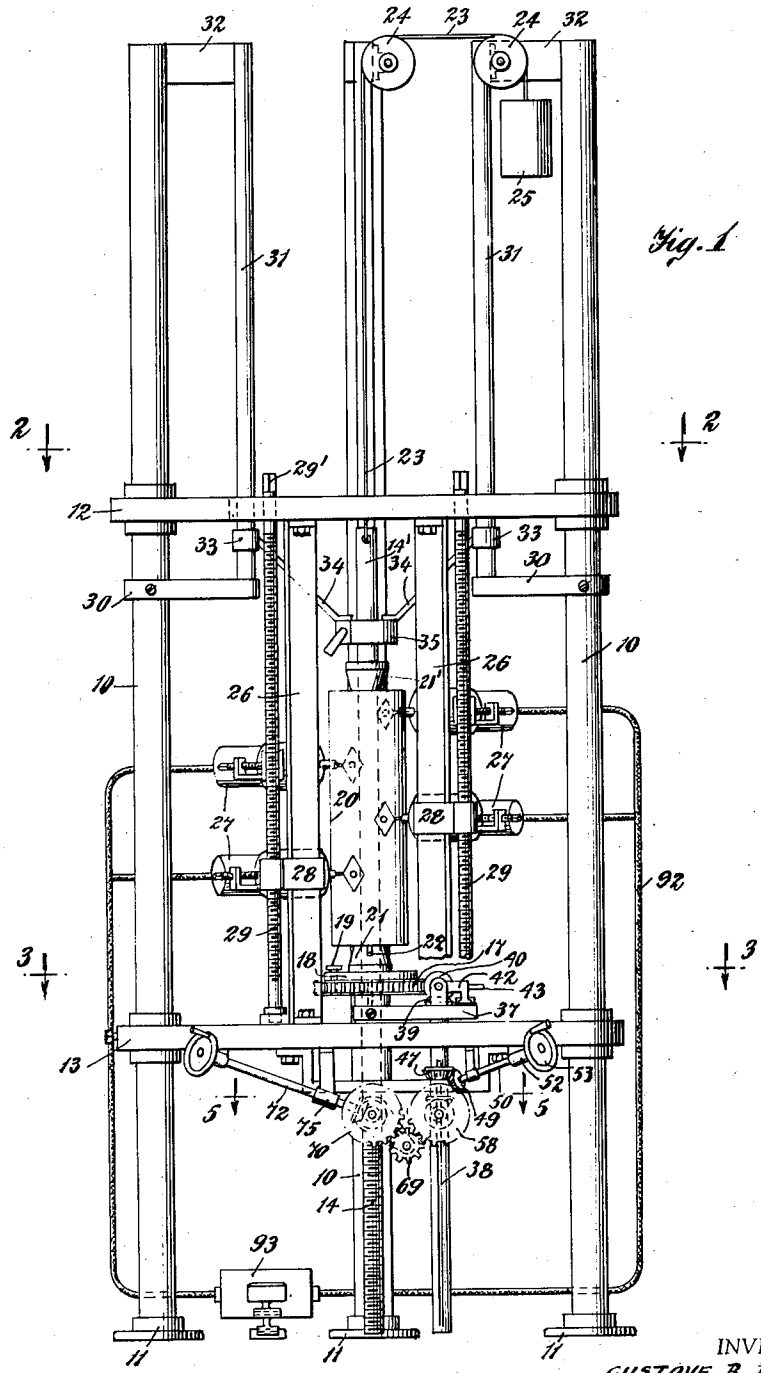

Fig. 1

INVENTOR.
GUSTAVE B. BOEHLE

BY

ATTORNEY.

Sept. 10, 1940. G. B. BOEHLE 2,214,450

MULTIPLE-REPEAT ROUTER

Filed April 17, 1939 3 Sheets-Sheet 2

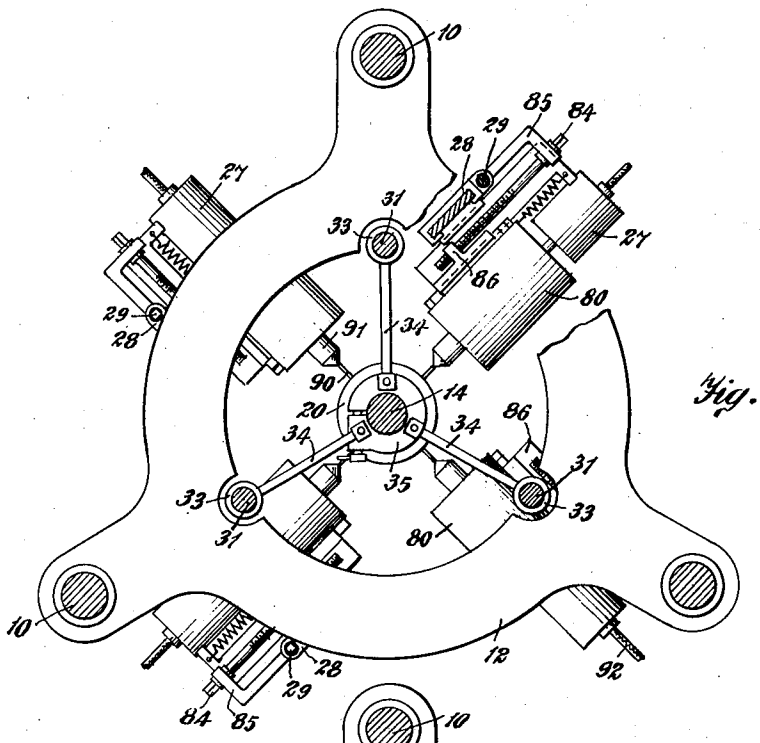

Fig. 2

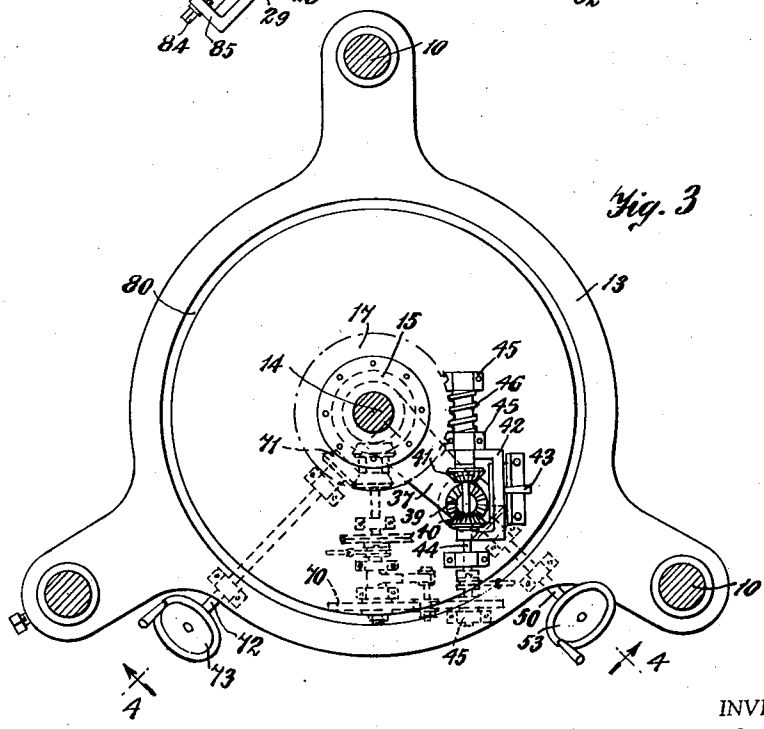

Fig. 3

INVENTOR.
GUSTAVE B. BOEHLE

BY

ATTORNEY.

Sept. 10, 1940. G. B. BOEHLE 2,214,450

MULTIPLE-REPEAT ROUTER

Filed April 17, 1939 3 Sheets-Sheet 3

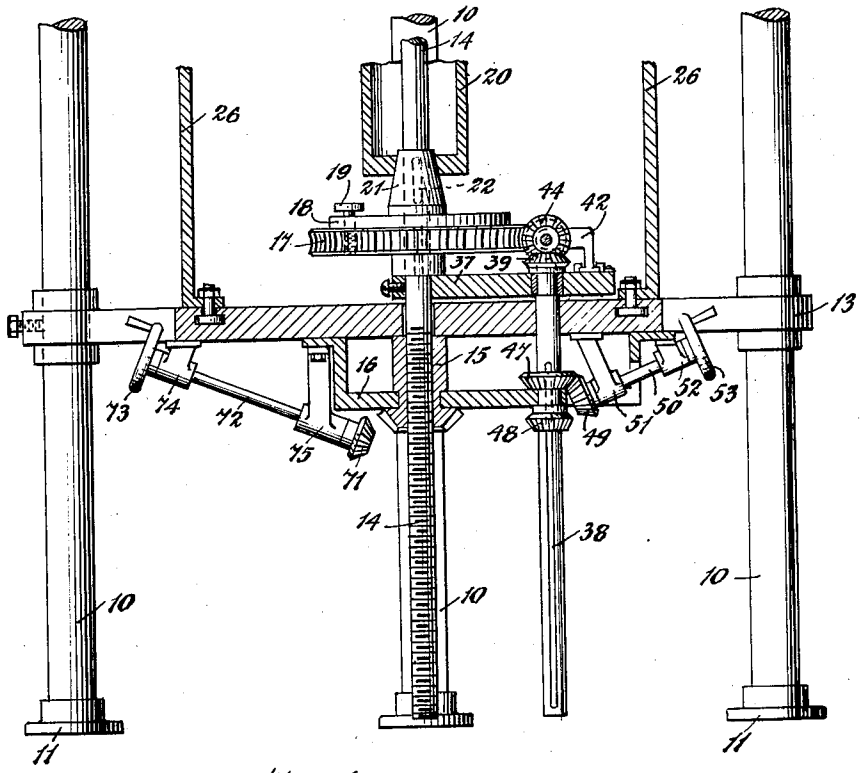

Fig. 4

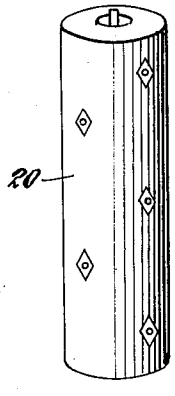

Fig. 6

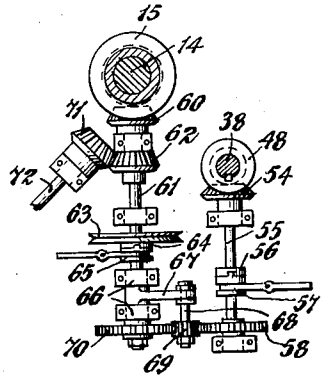

Fig. 5

INVENTOR.
GUSTAVE B. BOEHLE
BY Marvin Edmunds
ATTORNEY.

Patented Sept. 10, 1940 2,214,450

UNITED STATES PATENT OFFICE

2,214,450

MULTIPLE-REPEAT ROUTER

Gustave B. Boehle, Ozone Park, N. Y.

Application April 17, 1939, Serial No. 268,216

6 Claims. (Cl. 90—13.3)

This invention relates to routing or engraving machines, particularly to that type in which a plurality of cutter heads are employed for cutting designs on the surface of embossing or printing cylinders used in printing wall paper, oil cloth, fabrics and similar materials.

The main object is to provide means by which a number of like patterns may be cut on a cylinder simultaneously, whereby an advantage is obtained with respect to the exactness of the repeated patterns.

A further feature is in producing a machine in which it is not necessary to prepare an outline pattern over the entire surface of the cylinder, thus effecting a material reduction in cost.

Further objects and advantages will become apparent as the disclosure proceeds. These practical and novel developments are attained by the novel combination, construction and arrangement of parts hereinafter described and illustrated in the accompanying drawings, constituting a material component of this disclosure, and in which:

Figure 1 is a front elevational view of an embodiment of the invention, showing a printing cylinder held in the machine and cutting units in operative position.

Figure 2 is an enlarged transverse sectional view taken on line 2—2 of Figure 1, partially broken away to show the cutter driving motors and adjusting elements associated therewith.

Figure 3 is a similar sectional view taken on line 3—3 of Figure 1, showing relative position of certain control mechanism.

Figure 4 is a fragmentary vertical sectional view taken on line 4—4 of Figure 3, showing the main shaft, and mechanism operating the dividing head.

Figure 5 is a fragmentary plan view showing the change gears and means for varying the movement of the cylinder carrying mechanism.

Figure 6 is a perspective view of a conventional print roller bearing a design thereon.

Referring in greater detail to the drawings, it will be seen that structure, as shown in Figure 1, consists of three upright circular posts 10 arranged in triangular formation and having at their bottoms flanged plates 11 to be secured rigidly to a floor.

Slidable on the posts 10 are cross frame members 12 and 13, respectively upper and lower, provided with hubs bored to engage the posts. The lower cross frame 13 has a central bored opening through which an elevation screw 14 freely passes. Movement is imparted to this screw by the threaded hub of a bevel gear 15, supported in a bracket 16 fixed to the underside of the cross frame 13. The upper portion of the elevating screw 14 is straight, and unthreaded, to carry a worm gear 17 keyed slidably thereto.

Adjacent the upper face of the worm gear is a plate 18 free to turn on the screw shaft 14, and provided with accurately spaced openings or divisions in which a dividing screw 19 engages; when the screw 19 is released the plate 18 may be turned forward or backward one or more holes, which action provides a simple, accurate dividing mechanism.

The printing roll or cylinder 20 has a central longitudinal bore, somewhat larger than the shaft 14, so that the centering cones 21 may enter. To prevent rotation of the cylinder on the cones, a key 22 on the lower cone 21' engages a keyway formed in the cylinder ends. At the upper end of the cylinder is a guide cone 21' on the end of a shaft 14' to which is attached a rope 23 trained over grooved wheels 24 to a counterbalance weight 25.

Bolted to the inner sides of the cross frames 12 and 13, are vertical spacing rails 26 on which are adjustably mounted a plurality of motors 27, driven by air or electric power. Means for clamping these motors in adjusted positions are shown as at 28, each motor having upright adjusting screws 29, their lower ends rotatably mounted on the cross frame 13.

Clamped to the posts 10 are radial arms 30, carrying at their inner ends raised vertical rods 31, held in alignment by bars 32 rigidly secured to the upper ends of the posts 10. Near the lower end of the rods 31 are fixed collars 33 having integral down turned brace bars 34, their lower ends rigidly secured to a centralizing split ring 35, adapted to be clamped to the shaft 14.

A support arm 37, freely engaging the shaft 14, extends radially outward and is provided with an opening receptive of a splined shaft 38 having at its upper end a bevel gear 39 to mesh with either of the bevel gears 40 and 41, according to the position of a gear shift yoke 42, manually operated by the handle 43, and slidable on a shaft 44 supported in bearings 45.

Fixed on the shaft 44 is a worm 46 in mesh with the worm gear 17.

Slidably keyed on the shaft 38, and supported by the bracket 16, are a pair of bevel gears 47 and 48; the gear 47 is in mesh with another bevel gear 49, fixed on a spindle 50, mounted in bearings 51 and 52, secured to the lower cross frame

13, the last named gear operable by a hand wheel 53.

The lower bevel gear 48 (see Figure 5) is meshed with a bevel gear 54, fixed on one end of a divided shaft 55, positioned at a right angle to the shaft 38, and has a clutch element 56. A mating clutch element 57 is fixed to the shorter end portion of the divided shaft 55.

In mesh with the bevel gear 15 is a bevel pinion 60, fixed on a divided shaft 61; a reversed bevel pinion 62 is also fixed on the shaft 61, and a grooved drive pulley 63, slidable on the shaft, has a hub clutch element 64; fixed at the inner end of the outer portion of the divided shaft 61 is a mating clutch element 65. An arm 67 journalled on the shaft 61 has a stud 68 carrying an intermediate pinion 69 in mesh with the spur gear 58, on the outer end of the shaft 55; near the outer end of the shaft 61 is keyed a spur gear 70 in mesh with the pinion 69.

It will be understood that the gears 58 and 70 may be changed to others having different diameters for the purpose of varying the vertical feed of the cylinder 20. Manual means for raising and lowering the shaft 14 and associated parts consists of a bevel gear 71, in mesh with the bevel gear 62, and fixed to a shaft 72 rotated by a hand wheel 73, and supported in bearings 74 and 75.

Mechanical means are shown in Figure 2, for obtaining fine adjustment of the motors 27 and milling heads 30 in vertical and radial directions; vertical adjustment is attained by the screws 29 and co-operating slides 28; radial adjustment is made by rotation of screws 84 held in yokes 85 to actuate slides 86 fixed on the milling heads 30.

The cutters 90 may be of various shapes and sizes best adapted to the work and are held in holders or chucks 91.

In operation, a blank print cylinder is stood upright on the lower cone 21, the upper cone having been raised to present a clear space therebelow, this being easily accomplished due to the weight 25.

It will be understood that the cutter heads will also have been retracted to avoid interference.

When a fresh cylinder is entered, the upper cone is lowered to act as a center on which the cylinder is freely revoluble, and is caused to revolve by the key in the lower cone.

Raising and lowering the cone can be done by manipulating the hand wheel 73, which actuates the gear train carrying the lower cone, while rotation of the cylinder is done by the hand wheel 53.

The cylinder may be divided as may be required by readjustment of the screw 19.

Independent vertical adjustment of the cutter heads is accomplished by rotation of the screws 29, which are provided at their upper extremities with wrench receiving heads 29'.

The motor-unit 27 is adjustable towards and from the surface of the cylinder by wrenches applied to the heads 84 of the adjusting screws. In this manner the routing-tool is set to a predetermined depth of cutting to be made upon the surface of the cylinder.

In addition to the above adjustment, which is made before actual routing begins, each router-motor slides independently on a dove-tail guide towards the surface of the cylinder. This action is imparted to the router-motor by a hydraulic pressure cylinder and its piston action is under constant control of the operator by the pedal device 93 as shown in Fig. 1. The disengagement of the cutting-tool is made by a strong spring action upon the router-motor, whenever the foot-pressure on the pedal 93 is released. Pedal 93 acts upon a piston of the master-cylinder, forcing hydraulic pressure to the smaller cylinders at the rear of each router-motor through flexible and adjustable conduits 92.

The router-motor unit 27 is of the usual construction. A half horse-power rating is sufficient, per motor, driven at 18,000 per minute. The leverage ratio for hand-feed is usually 1:250. Metal cuts taken are usually from $\frac{1}{16}$'' to $\frac{1}{4}$'' in depth.

From the foregoing, it will be seen that a practical and simple mechanism has been disclosed in which one or more router-motor-units may be used. They can be placed advantageously for an operator's adjustment and practical routing upon a cylindrical surface; it will also be further apparent that any possible design can be routed with accuracy and ease.

Having thus described the invention, including the manner of its construction and application, what is claimed as new and sought to secure by Letters Patent, is:

1. A routing machine for cutting a plurality of similar patterns on a printing cylinder, comprising a frame, a plurality of routing motors mounted in said frame, means for positioning a printing cylinder in said frame, means for moving said cylinder vertically relative to the cutting means of said motors, means for moving said cylinder rotatively relative to said cutting means, means for adjusting the cutting depth of said routing motors, and means for adjusting the motors longitudinally in said frame.

2. A routing machine for cutting a plurality of similar patterns on a printing cylinder, comprising a frame, a plurality of routing motors mounted in said frame, a screw shaft mounted in said frame, a printing cylinder retaining cone revolubly mounted on said shaft, a second cone for releasably securing said cylinder, a worm gear to drive said shaft cone, means for moving said shaft, and means for turning said worm gear whereby said cylinder will move vertically and rotatively relative to said routing motors.

3. A routing machine for cutting a plurality of similar patterns on a printing cylinder, comprising a frame, a plurality of routing motors mounted in said frame, a screw shaft mounted in said frame, a printing cylinder retaining cone fixed on said shaft, a second cone for releasably securing said cylinder on the shaft cone, a worm gear engaged with said shaft cone, means for rotating said shaft, means for turning said worm gear, and clutch means associated with said last two means to selectively move said cylinder vertically and circumferentially relative to said routing motors.

4. A routing machine for cutting a plurality of similar patterns on a printing cylinder, comprising a frame, a plurality of independent routing motors each adjustably mounted in said frame to move into different relation, a screw shaft mounted in said frame, a printing cylinder retaining cone revolubly mounted on said shaft, a second cone for releasably securing said cylinder, a worm gear to drive said shaft cone, means for moving said shaft, and means for turning said worm gear whereby said cylinder will move vertically and rotatively relative to said routing motors.

5. A routing machine for cutting a plurality of similar patterns on a printing cylinder, comprising a frame, a plurality of routing cutter motors mounted in said frame, said motors independ-

ently adjustable into different planes, a screw shaft mounted in said frame, a printing cylinder retaining cone fixed on said shaft, a second cone for releasably securing said cylinder on the shaft cone, a worm gear engaged with said shaft cone, means for rotating said shaft, means for turning said worm gear, and clutch means associated with said last two means to selectively move said cylinder vertically and circumferentially relative to said routing cutter motors.

6. A routing machine for cutting a plurality of similar patterns on a printing cylinder, comprising a frame, a plurality of routing cutters mounted in said frame, at adjustably variable angles to the axis of the machine, means for positioning a printing cylinder in said frame, means for moving said cylinder vertically relative to said cutters, means for moving said cylinder rotatively relative to said cutters, means for adjusting the cutting depth of cutters, means for adjusting the cutters longitudinally in said frame, and means to drive said cutters.

GUSTAVE B. BOEHLE.