(No Model.) 2 Sheets—Sheet 1.

G. W. SYMONDS.

ROUTING MACHINE.

No. 543,110. Patented July 23, 1895.

Fig.1

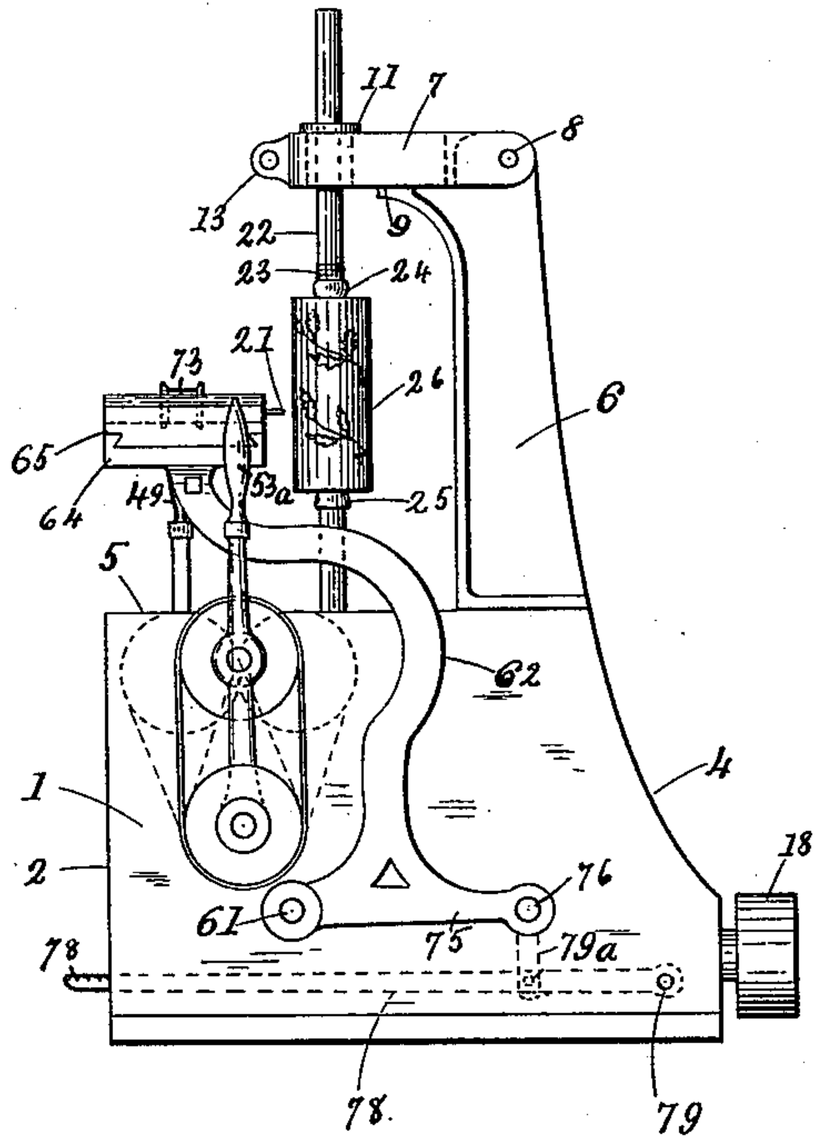


Fig.2

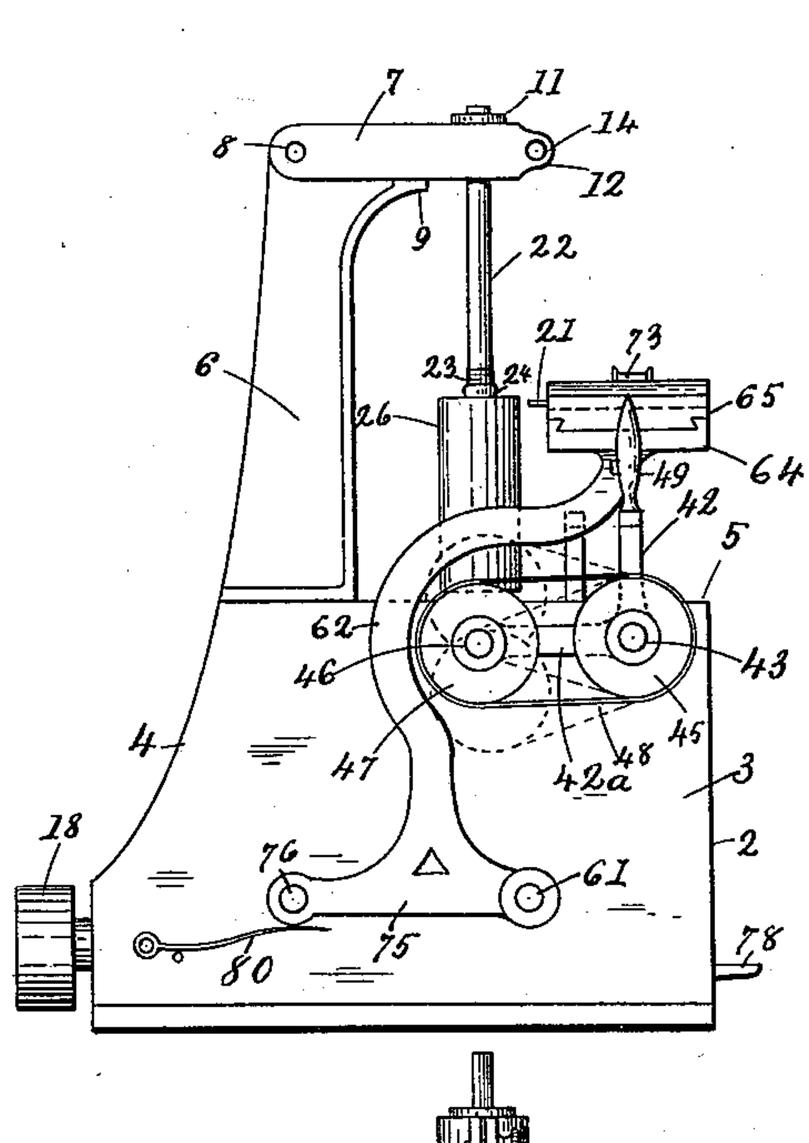


Fig.3

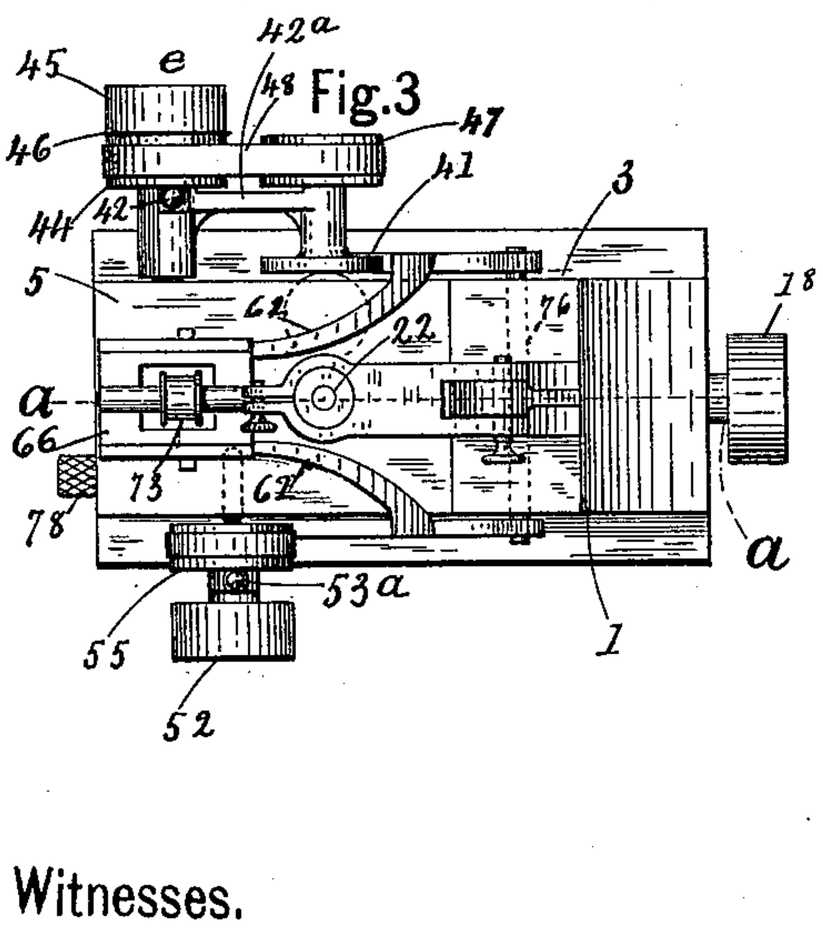
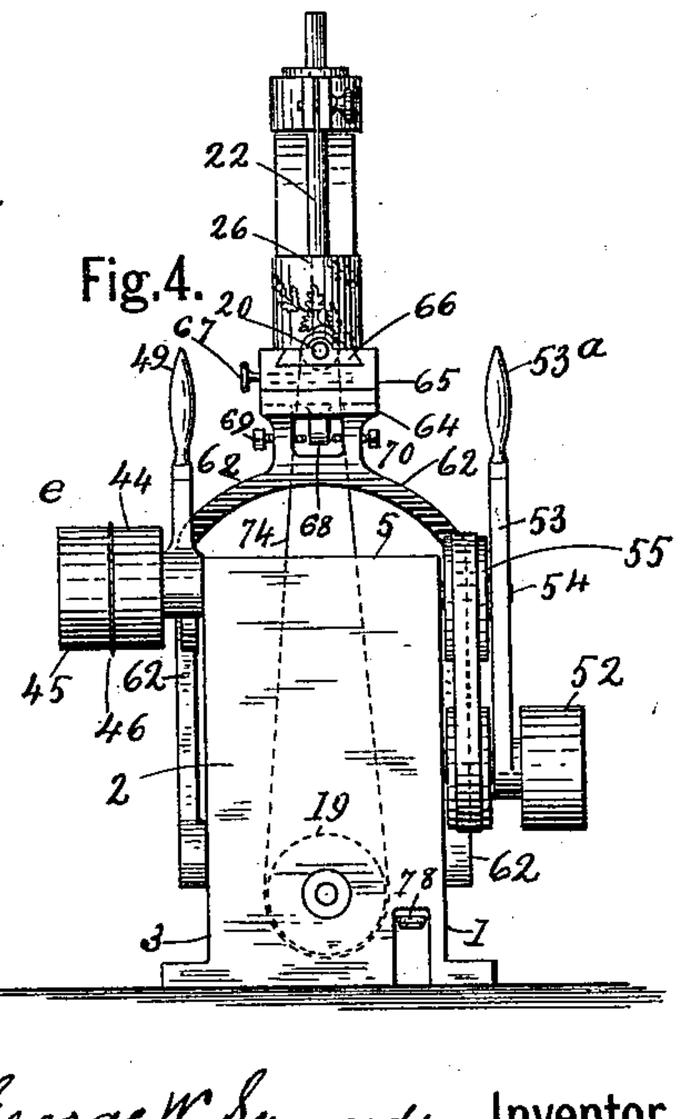


Fig.4.



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(No Model.) 2 Sheets—Sheet 2.

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ROUTING MACHINE.

No. 543,110. Patented July 23, 1895.

Fig.5.

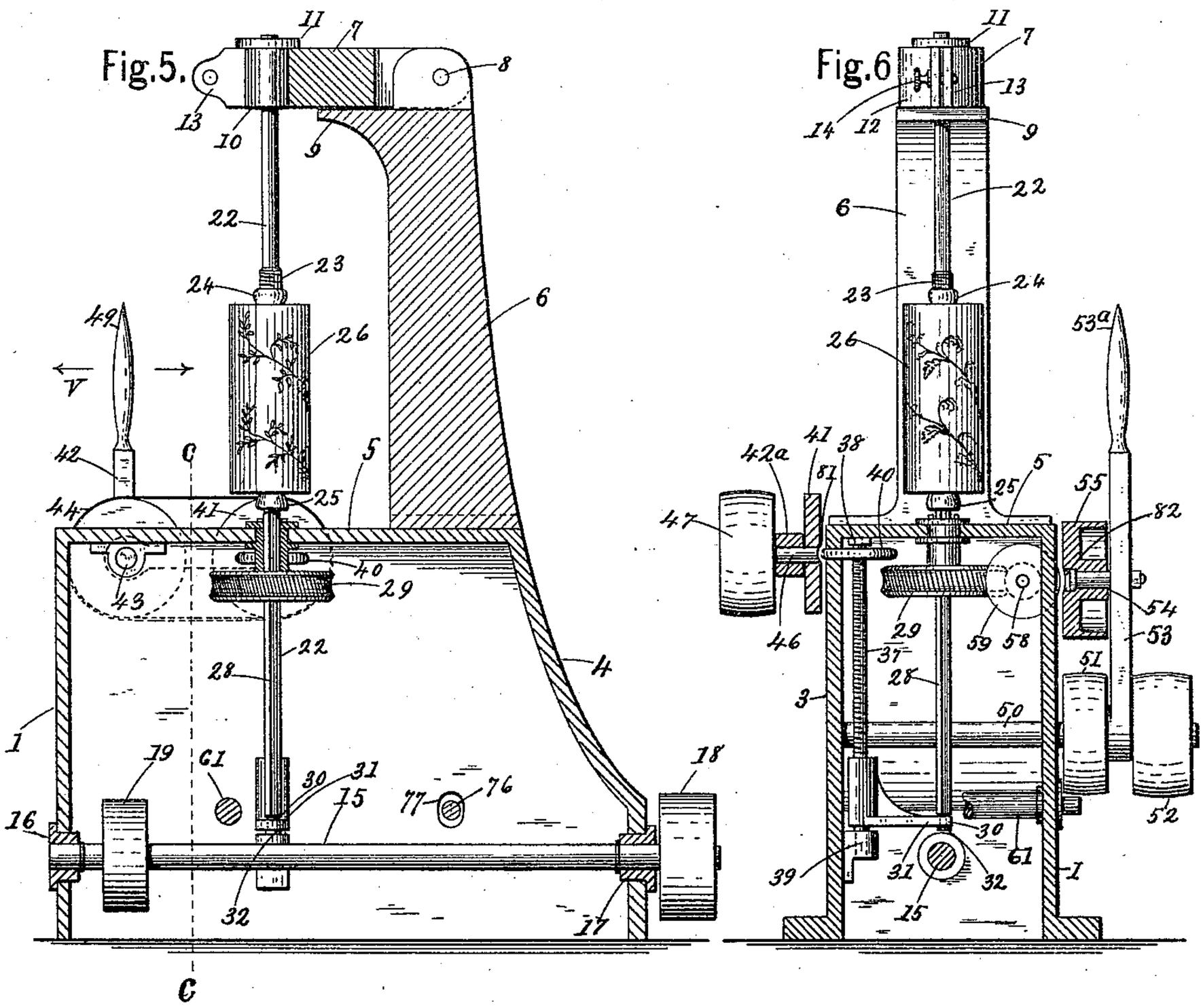


Fig.6

Fig.7.

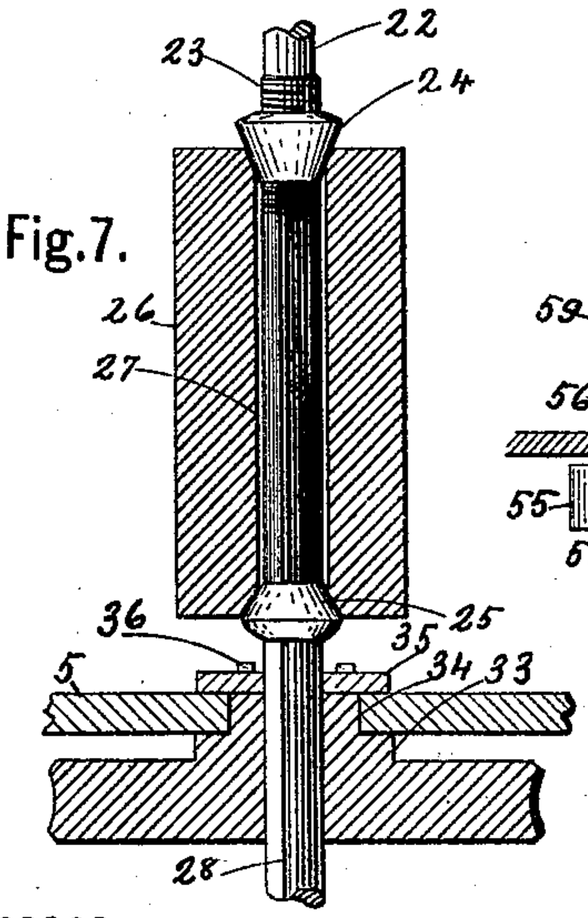


Fig.8.

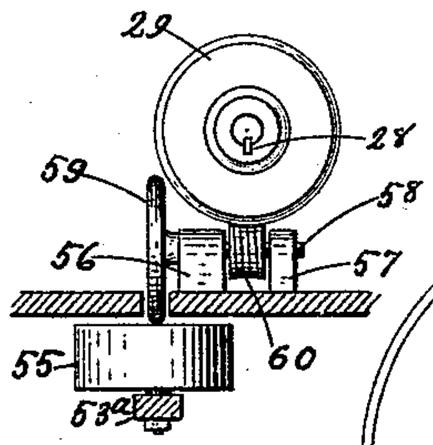
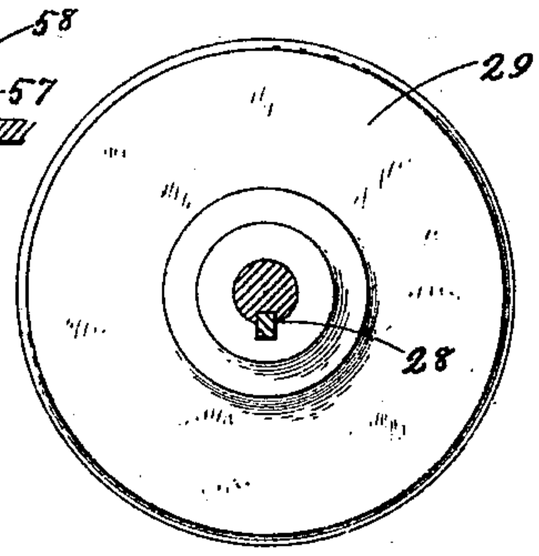


Fig.9.



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UNITED STATES PATENT OFFICE.

GEORGE W. SYMONDS, OF BUFFALO, NEW YORK.

ROUTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 543,110, dated July 23, 1895.

Application filed September 28, 1894. Serial No. 524,378. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. SYMONDS, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Routing-Machines, of which the following is a specification.

My invention relates to an improved means for producing designs upon print-rollers for printing upon wall-paper or for other similar purposes, and will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation showing the pattern-roller in place on the machine and raised partly upward. Fig. 2 represents a reverse side elevation for showing the mechanism on the opposite side of the machine, showing also the pattern-roller in its lowest position thereon. Fig. 3 is a top or plan view of the machine complete. Fig. 4 represents a front elevation of the machine, showing by dotted lines the pulley and belt for driving the cutting or routing tool. Fig. 5 represents a vertical longitudinal section cutting centrally through the frame of the machine and hub of the worm-wheel on or about line *a a*, Fig. 3, showing a side elevation of the interior mechanism, the cutting-spindle and tool and its supporting mechanism being omitted. Fig. 6 represents a vertical transverse section through the frame of the machine on or about line *c c*, Fig. 5, showing a front view of the interior operating mechanism, showing also a vertical central section through the vertical friction-disks, one at each side of the machine, the cutting-tool, spindle, and its supporting mechanism being omitted. Fig. 7 is an enlarged vertical central section through one of the print-rollers, cutting also through a portion of the top of the frame of the machine and centrally through the worm-wheel. Fig. 8 represents a detached top view of the friction-gearing and worm-wheel for operating the worm-gear wheel and rotating the print-roller shaft, a horizontal section being shown through a portion of the side of the frame to which the boxes are attached, in which is mounted said friction-gear and worm-wheel shaft. Fig. 9 represents an enlarged top or plan view of the worm-gear wheel, showing also a horizontal or cross section through the vertical shaft upon which it is mounted.

Referring to the drawings in detail, the frame of the machine consists of a substantially rectangular case having its sides 1, 2, 3, and 4 and its top 5 constructed, preferably, of cast-iron; but it may be made of any suitable material or shape. It is provided with a supporting-standard 6, having at its top an overhanging supporting-arm 7, pivoted thereto by a pin 8. The forward end of the arm 7 when thrown forward in its normal position rests on the forwardly-projecting portion 9 of the supporting-standard 6. The object in thus pivoting the supporting-standard will be described farther on.

The forward end of the overhanging arm 7 is provided with a vertically-removable box 10, and at the front the vertical opening in which the box 10 passes until stopped by its flange 11 is split and provided with clamping portions 12 and 13. A thumb-nut 14, which runs loosely in one of the clamping portions and screws into the other, affords the well-known means for tightening the removable box 10 rigidly when in place.

Near the bottom of the supporting frame is a horizontal driving-shaft 15 mounted in the horizontal bearing-boxes 16 and 17. On the shaft 15 is rigidly secured in any well-known way the driving-pulley 18, (see Fig. 5,) and within the frame or case is mounted on said shaft a pulley 19 for driving the spindle 20, that carries the cutting or routing tool 21.

22 represents the vertical print-roller shaft. The upper end of this shaft is mounted in the removable vertical box 10, so that it can move freely up or down or rotate therein. The lower portion of the shaft 22 is slightly enlarged and provided with a screw portion 23, on which is mounted a conical screw-nut 24, and a short distance below the screw portion is a conical collar 25.

From the above construction it will be seen that a print-roller 26 can be easily put on to the shaft 22 by moving the shaft down to the limit of its downward movement or to the position shown in Figs. 5 or 6, then removing the box 10 and turning the overhanging arm 7 up and over out of the way, then by removing the nut 24 the roller, which is provided with an opening 27 through it, (see

Fig. 7,) can be put down over the shaft 22 and tightened rigidly in place to said shaft by means of the nut 24, after which the box 10 is again put in place and the roller is ready to be operated upon.

The lower portion of the shaft 22, below the collar 25, is provided either with a groove or feather 28, and passes through a worm gear-wheel 29 adapted to fit the shaft and feather, so that while the shaft has a free up-and-down movement through the worm gear-wheel it cannot turn therein.

The foot of the shaft 22 is provided with a reduced portion 30, (shown by dotted lines in Fig. 6,) which passes down through an opening in the end of a bracket 31 until stopped by the surrounding under portion of the shaft above the reduced portion, the reduced portion extending down through and slightly below the under side of the bracket and having a collar 32 secured to it by a screw or other well-known means, and as the collar 32 forms a shoulder below the bracket a well-known bearing is formed for the shaft in which it can rotate freely without being moved in the direction of its length either way from its bearing or the box in which it rotates.

The hub of the worm gear-wheel is secured to the top 5 of the frame or case, so that while it is free to turn in its bearing it cannot be withdrawn from it, as follows: The hub 33 (see Fig. 7) is provided with a reduced portion 34, which projects up through the top 5 until the shoulder made by the larger portion 33 rests up against the under side of said top. A collar 35, through which the shaft 22 moves or turns, is then rigidly secured to the hub by bolts 36.

In Figs. 5 and 6 I have shown a slightly-modified form of the hub 33 by making the hub and reduced portion of substantially the same diameter and the enlarged portion in the form of a collar, substantially as shown.

The bracket 31 is mounted on a vertical screw-rod 37, supported in journal-boxes 38 and 39, reference being had to Fig. 6. At the top of the screw shaft or rod 37 is rigidly secured a horizontal friction-disk 40. The disk 40, when the machine is in operation, engages with the face of a substantially-vertically movable disk 41 (see Figs. 5 and 6) and is operated by it. This disk 41 is mounted on a bell-crank arm 42 42ª, (see Figs. 2, 3, and 4; also Figs. 5 and 6,) which is mounted on a pivotal portion 43 (see Figs. 2 and 5) rigidly secured to the side of the frame. On this pivotal portion or shaft 43 is mounted a wide pulley *e*, divided into two parts 44 and 45 (see Fig. 3) by a little projecting surrounding rib 46; but if desired the rib may be dispensed with and the entire face of the pulley made smooth. The outer portion 45 is the driving portion of the pulley. At the opposite end of the horizontal portion of the arm is mounted a shaft 46, having the disk 41 rigidly secured to its inner end and a pulley 47 secured rigidly to its opposite end. The pulley 47 and the portion 44 of the wide pulley *e* are connected by a belt 48, so that the driving portion 45 turns the pulley 47 and disk 41 at the same time. The vertical portion of the bell-crank arm terminates in a handle 49.

From the above construction it will be seen that by moving the handle 49 in the direction of the arrow V the horizontal friction-disk 40 may be made to turn in one direction and that the speed of the disk 40 may be varied at the will of the operator, and by moving the handle 49 in an opposite direction a similar action will be given to the disk 40 in a reverse direction, and thus the print-roller may be made to move either up or down with a varying speed.

A transverse shaft 50 (see Fig. 6) is mounted in suitable boxes in the frame of the machine and on this shaft are rigidly secured two pulleys 51 and 52, the pulley 52 acting as a driving-pulley. Between the pulleys 51 and 52 is loosely mounted an arm 53, having a handle 53ª, and directly above the pulley 51 is mounted loosely on a short pin or shaft 54, which is rigidly secured to the said arm 53, a combined friction disk and pulley 55. The pulley or disk 55 is a web-pulley, its inner side acting as a friction-disk.

On the inside of the frame of the machine is mounted, in boxes 56 and 57 on a horizontal shaft 58, (see Figs. 6 and 8, where this construction is more clearly shown,) a friction-wheel 59, and a worm-wheel 60 is rigidly secured to the shaft 58, and the worm-wheel engages with the worm gear-wheel 29. The peripheral face of the friction-wheel 59 rests against the side face of the friction-disk 55 with sufficient force to be operated by it, so that by moving the handle 53ª back or forward the print-roller shaft may be made to rotate when the machine is operating in either direction, it being understood that when I say "the machine is in operation" the driving-pulleys 45 and 52 are each being rotated by means of a belt connecting them with pulleys operated by a steam-engine or other source of power.

A transverse shaft 61 is mounted in suitable boxes in the frame of the machine, and at each side of the machine, rigidly secured to said shaft, is a curved arm 62, the two arms curving together at the top in the form of an arch, or substantially so, upon which is secured a dovetailed slideway-bed 64. In this slideway is mounted a transverse slideway portion 65, adapted to slide either way—transversely or sidewise. In this slideway portion 65 is another portion 66, adapted to slide longitudinally backward or forward or in a direction at right angles to the transverse movement of the portion 65. The portion 66, when adjusted to the point desired, is rigidly secured by a set-screw 67. (See Fig. 4.)

The transverse slideway portion 65 is made adjustable by means of a lug 68, which ex-

tends down through an opening in the portion 64, and two oppositely-adjustable set-screws 69 and 70, by which it is rigidly fixed at any point to which it may be adjusted.

On the longitudinally-adjustable slideway portion 66 is mounted in suitable bearings the spindle 20. (See Fig. 4, where the end of this spindle is shown.) In the front end of this spindle is secured the routing or cutting tool 21. (See Figs. 1 and 2.) The spindle 20 is driven by means of a small pulley 73, rigidly secured to it, and a belt 74, which extends downward and connects with the pulley 19. (See Fig. 4, where this belt is shown partly in dotted lines.) It is intended for and adapted to be driven at a very high rate of speed—from fifteen to eighteen thousand revolutions a minute.

Extending backward from the lower ends of each of the arms 62 is a horizontal arm 75, the ends of which are connected to a transverse shaft 76. (Shown by dotted lines in Fig. 3 and in section in Fig. 5.) This shaft passes through an elongated hole 77 (see Fig. 5) in each side of the machine frame or case, and within said frame is a foot-step 78, which extends back and is pivoted by a pin 79, (see Fig. 1,) where this pivotal pin is shown and the greater portion of the foot-step is shown by dotted lines.

The foot-step and a shaft 76 are connected by a connecting-link 79ª, (also shown in Fig. 1 by dotted lines,) so that every time the foot-step is forced downward the routing or cutting tool is moved forward, and gravity brings the arms back to their normal position when the foot-step is released. Should gravity not be sufficient, a spring 80 (shown in Fig. 2) may be used to assist.

By the construction above described the driving-pulley 18 drives the cutting apparatus, and the driving-pulleys 45 and 52 drive the mechanism that moves the print-roller through either its rotary or vertical movements, and all the operator does by means of the handles is to control the direction and rapidity of motion of the parts driven by the driving-pulleys 18, 45, and 52. In this way the print-roller may be raised and lowered or made to rotate with a varying speed, so that a spiral or any other form of line or engraving may be cut on the roller by the cutting-tool. The motion of these parts may also be stopped at any time while all the driving-pulleys and friction-disks 41 and 55 are running, by moving said disks so that their centers will be in a line with the centers of the disks 40 and 59, which they operate, or so that the disks 40 and 59 will run in the central depressions 81 and 82 in the continuously-rotating friction-disks 41 and 55, or either of them, as will be readily seen by reference to Figs. 5 and 6. The operator has, therefore, full control over the direction of all the movements made by the mechanism operating the print-rollers, but takes no part in producing said movements.

By means of the lateral adjustment of the cutting-tool 21 I am enabled to cut into the roller without undercutting, or so that one side of the cut will be in a radial line from the center of the print-roller, or so that a printing-line will be cut of the same thickness at the top as at the bottom. At the same time, by means of the said lateral adjustment, I am enabled to undercut a line if required.

I claim as my invention—

1. In a routing machine, the combination of a printing roller shaft mounted in vertical bearings in the supporting frame so as to be capable of a combined vertical and rotary movement, means for securing a printing-roller thereon or removing it therefrom, friction gear for giving the roller shaft a varying up and down movement, a lever handle for operating and controlling the action of the said friction gear, and means for giving said roller shaft a varying rotary movement, in either direction consisting of a variable friction gear and lever handle, substantially as described.

2. In a routing machine, the combination of a printing roller-shaft mounted in vertical bearings on the machine frame, means for securing a printing roller thereto, a vertical screw shaft mounted in boxes below the top of the machine table, a bracket having one side in engagement with the screw thread on the vertical screw shaft and the other side connected with the foot of the printing roller shaft and secured between shoulders on said shaft so that while said printing roller shaft has a free rotary movement it cannot move longitudinally either way from said bracket, a horizontal friction disk secured near the top of and to the vertical screw shaft, a driving friction disk, in frictional contact with the horizontal friction disk and means substantially as above set forth, for giving the driving friction disk a rotary movement, and a vertical or lengthwise movement to the printing roller-shaft as described.

3. In a routing machine, the combination with a swinging frame pivoted to the lower portion of the supporting frame, of a spindle carriage at the top of the swinging frame having a routing or cutting tool spindle mounted in suitable bearings thereon and carrying a routing or cutting tool, means for giving the same a rapid rotary motion, means for adjusting the routing tool carriage laterally toward or from either side of a radial line from the center of the printing roller for the purposes set forth and a foot-step pivoted to the machine frame, connected by a link with the swinging frame for bringing the routing or cutting tool up to its work, substantially as described.

4. In a routing machine, the combination with a swinging frame pivoted to the base of the supporting frame, of a spindle carriage at the top of the swinging frame mounted in suitable bearings thereon and carrying a routing or cutting tool, means for giving the routing

tool spindle a rapid rotary motion, means for adjusting the routing tool carriage laterally either side of a radial line from the print roller, means for adjusting the routing tool carriage longitudinally toward or from the print roller and a foot step pivoted to the machine frame and connected by a connecting link with the swinging frame for bringing the routing tool to its work, substantially as described.

5. In a routing machine, the combination with a printing roller shaft mounted in vertical bearings on the machine frame, means for securing a printing roller thereto, a vertical screw shaft mounted in boxes within the machine frame, a bracket having one side in engagement with the screw thread on said vertical screw shaft and the other side secured between shoulders to the foot of the printing roller shaft so that while it has a free rotary movement it cannot be drawn therefrom, a horizontal driven friction disk secured near the top of and to the vertical screw shaft, a driving friction disk mounted in horizontal bearings and in frictional contact with the driven friction disk, means for giving the driving friction disk a rotary movement, and means connected with a hand lever for moving the driving friction disk across the face of the driven friction disk and thereby directing and varying the up or down movements of the printing roller-shaft, substantially as described.

6. In a routing machine, a printing roller shaft mounted in bearings on the machine frame, and means for moving it longitudinally up and down, in combination with a worm gear wheel mounted in a bearing on the under side of the machine table so that it can rotate but not be drawn therefrom and through which the vertical shaft reciprocates during its up and down movements but is prevented from turning therein by means of a feather, a worm wheel mounted on a horizontal shaft in bearings on the inner side of the frame of the machine, and adapted to engage with the worm gear wheel, a driven friction disk rigidly secured to the outer end of said shaft a combined driving friction disk and pulley, in engagement therewith, and mounted on a swinging arm having its lower end connected with the driving shaft, a pulley on said driving shaft directly under the driving friction disk the two being connected by a belt, and a driving pulley secured to the outer end of said driving shaft, for the purposes described.

7. In a routing machine, the combination with the vertical printing roller shaft and its supporting mechanism, of a pivoted overhanging arm adapted to swing over back of the supporting standard out of the way, a removable journal box in said overhanging arm adapted to receive the vertical printing roller shaft and means substantially as above described for tightening said box when in place, for the purposes described.

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