No. 805,700. PATENTED NOV. 28, 1905.

P. V. AVRIL.

ENGRAVING MACHINE.

APPLICATION FILED DEC. 13, 1904

2 SHEETS—SHEET 1.

FIG. 2.

FIG. 3.

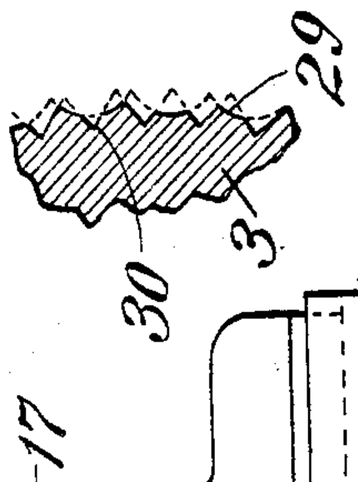

FIG. 1.

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2 SHEETS—SHEET 2.

FIG. 4.

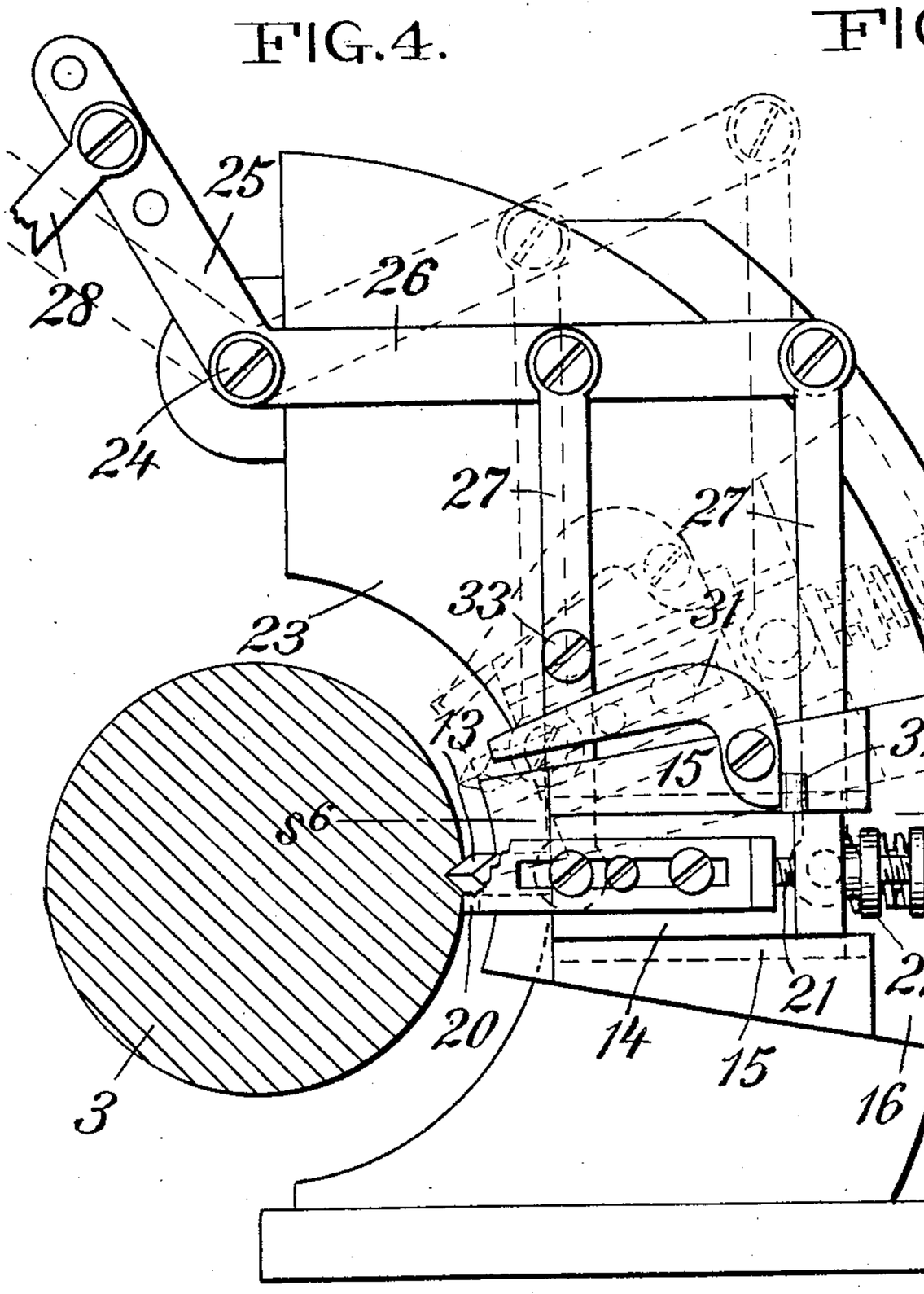


FIG. 5.

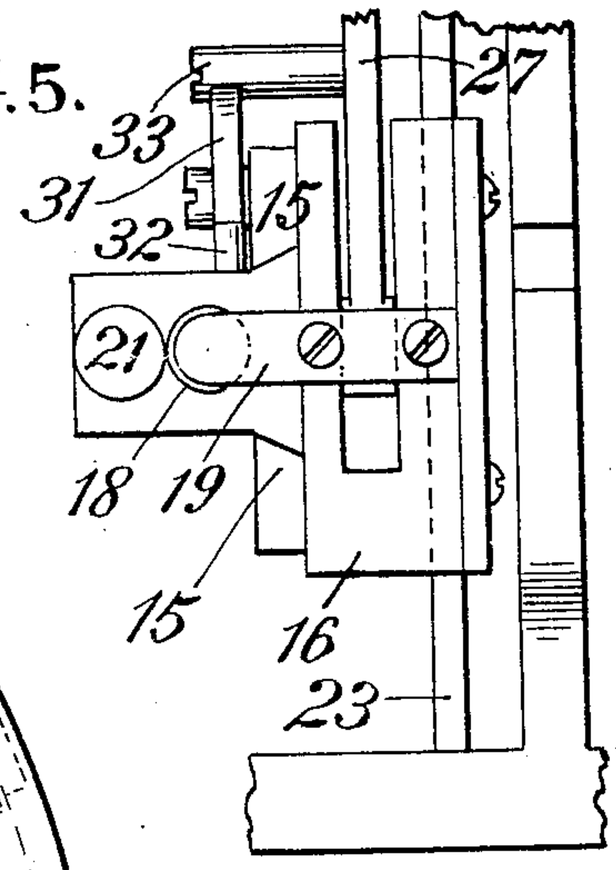
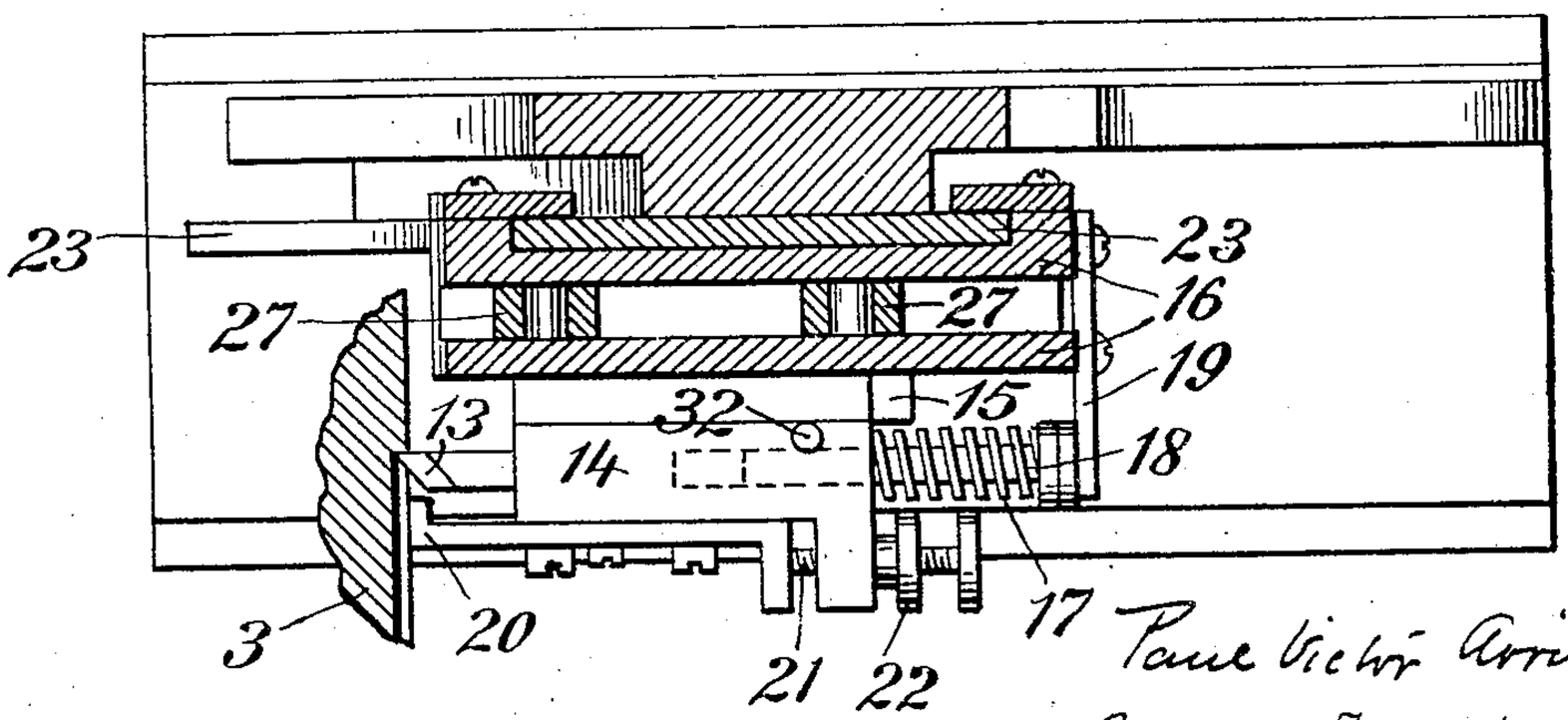


FIG. 6.



Witnesses
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UNITED STATES PATENT OFFICE.

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ENGRAVING-MACHINE.

No. 805,700. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed December 13, 1904. Serial No. 236,678.

To all whom it may concern:

Be it known that I, PAUL VICTOR AVRIL, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in Engraving-Machines, of which the following is a specification.

My invention relates to automatic engraving-machines, and, as herein embodied, is adapted for reproducing certain designs, design elements, or the like in moire effects by means of two sets of intersecting grooves.

The particular type of engraving-machine to which my invention relates is described in several of my pending applications—to wit, Serial No. 221,985, filed August 24, 1904; Serial No. 222,188, filed August 25, 1904, and Serial Nos. 227,572 and 227,574, filed October 7, 1904.

For convenience in illustrating my invention as applied I have shown it in the accompanying drawings in connection with a machine substantially similar to that described in my application serially numbered 227,574, above referred to, which consists, essentially, in a lathe-mounting for the design and blank cylinders, together with requisite feed mechanism for producing relative motion between the cylinders and the tools coöperating therewith and controlling devices for regulating the feed.

I wish it understood that I do not limit myself to either the exact construction or arrangement of parts shown, as it will be obvious that various other mechanisms may be employed operating in substantially the same manner to produce practically the same result.

In the drawings, Figure 1 is an end elevation of an engraving-machine with parts broken away to show the traversing style and engraving-tool in connection with the cylinders with which they coöperate. Fig. 2 is a detail view showing a portion of the engraved surface of the cylindrical blank. Fig. 3 is a cross-sectional view thereof. Fig. 4 is an enlarged detail view showing the cylindrical blank and the engraving-tool mounted in operative relation thereto. Fig. 5 is a front view thereof with the cylinder omitted, and Fig 6 is a horizontal sectional view taken on the line s^6 s^6 of Fig. 4.

Referring now to the drawings, 1 represents a cylinder having upon its surface the model or design to be reproduced, which may be cut, molded, or otherwise formed thereon, either in intaglio or relief. The cylinder is mounted in a lathe 2 and is given a step-by-step rotary feed through suitable gearing, which I have fully described in my pending application, Serial No. 227,574, above referred to.

A blank in the form of a cylinder 3, of metal or other suitable material, upon the surface of which the design is to be reproduced, is mounted in a second lathe 4 and is geared to be given a step-by-step rotary feed in unison with the design-cylinder.

Coöperating with the design-cylinder there is a traversing style 5, carried by an arm 6, pivoted at 7 upon an adjustable bracket or extension of the carriage 4^a of lathe 4. The arm 6 is provided at its free end with a pin or stud 8, which is connected in circuit with a source of current-supply and is movable between two contact-plates 9 and 10, secured upon a disk 11. The disk 11 is fast upon a crank-shaft 12, mounted in bearings upon the carriage of lathe 4, and by means of oppositely-acting clutches (not shown) the crank-shaft is rotated first in one direction, then in the other, in accordance with the rise and fall of the style in traversing the undulating surface of the design-cylinder. Preferably the clutches employed are of the electromagnetic type, and current to the same is controlled by the pin 8 in moving in and out of contact with plates 9 and 10, which are connected in circuit with the clutches. As the present invention is not limited to any particular construction of the clutches or arrangement of the circuits, &c., further description of the same is not herein deemed necessary.

The carriage 4^a of lathe 4, carrying the crank-shaft, clutches, &c., is connected in the usual manner with the lead-screw, and by means of suitable automatic reversing mechanism is fed back and forth longitudinally of the lathe-bed between predetermined points.

Coöperating with the cylindrical blank 1 there is an engraving-tool 13, carried by a block or slide 14, movable in guides 15 of a sector 16. A spring 17, encircling a pin 18 and acting between a lug 19 of the sector and the slide 14, tends to force the tool toward the cylindrical blank; but the depth of cut is regulated and rendered uniform by means of

a gage 20 upon the slide, which is adjustable by a screw 21, threaded through a lug of the slide and secured by a lock-nut 22.

Upon a cross-slide of the carriage of lathe 4 there is a curved guide 23, shaped and arranged concentric with the cylindrical blank. The guide 23 serves as a support for the sector 16, which is movable thereon and as arranged serves to maintain the engraving-tool radially disposed to the cylindrical blank throughout its entire range of adjustment.

Motion is imparted to the sector from the crank-shaft 12 through a connection which I will now describe. Pivoted at 24 upon an extension of the guide 23 there is a bell-crank lever 25, one arm 26 of which is connected by links 27 27 in parallel relation with the engraving-tool. The other arm of the bell-crank lever is connected by a rod 28 with the crank of shaft 12. Thus arranged the oscillation imparted to the crank-shaft by the clutches under the control of the traversing style will be transmitted through the connection described to the sector carrying the engraving-tool, and as the sector is limited by the curved guide 23 to movement in an arc concentric with the cylindrical blank the resulting motion of the tool circumferentially of the blank will correspond to the rise and fall of the style in traversing the undulating surface of the design-cylinder. The curvature of the groove or line of cut produced by advancing the tool along the blank would therefore conform to the contour of that portion of the design-cylinder traversed by the style—as indicated, for example, at 29 in Fig. 2.

It being understood that the cylinders 1 and 3 are given a step-by-step rotary feed in unison and that the style 5 and tool 13 have the same motion longitudinally of their respective cylinders, it will be seen that a series of equispaced grooves of uniform width and depth throughout their length may be cut in the blank and given any curvature desired by providing the requisite surface formation upon the design-cylinder.

When, for example, the design to be engraved is made up of a series of straight grooves 30 and an intersecting series of curved or wavy grooves 29, as shown in Fig. 2, the straight grooves are preferably cut as the first step in the operation, or a fluted blank may be employed and the curved grooves subsequently added to complete the same.

When cutting the straight grooves, the rotary feed of the blank renders adjustment of the tool unnecessary, and the rod 28 may therefore be disconnected from the bell-crank lever 25 and the sector secured in fixed relation to the guide 23, or by disconnecting the machine from the source of current-supply the rod 28 may remain undisturbed, as no motion will be imparted to the crank-shaft.

Ordinarily the straight grooves are of V-shaped cross-section, and in order to produce the desired effect the intersecting curved grooves are given less depth and formed with a rounded tool, as indicated by dotted lines in Fig. 3.

It is desirable to limit the cutting action of the tool to movement in one direction, and for this purpose I provide a trip device and arrange the same to act to withdraw the tool as the carriage reaches the end of its travel on the cutting stroke and hold the same clear of the blank during the return of the carriage. This device consists of a cam-lever 31, pivoted upon the sector 16, with one end engaging a lug or projection 32 of the slide-block which carries the tool and the other end extending under a pin or stud 33 upon one of the links 27. Thus arranged it will be seen that upward movement of the sector upon the curved guide 23 will force the cam-lever into engagement with the pin 33 and by continuing this motion sufficient pressure will be exerted upon the long arm of the lever to overcome the spring 17 and cam the slide-block and tool carried thereby clear of the cylindrical blank, as indicated by dotted lines in Fig. 4.

In my pending applications above referred to I have described means for automatically throwing one of the clutches upon the crank-shaft into action to produce the required motion of the sector for operating the trip, and as similar mechanism may be here employed for the same purpose I do not consider it necessary to illustrate or describe the same in detail.

Having thus described my invention, I claim—

1. An automatic engraving-machine comprising means for rotatably supporting a cylindrical blank, a tool, means for giving the tool motion longitudinally of the blank, and means for automatically adjusting the tool through an arc struck from the axis of the blank as a center.

2. An automatic engraving-machine comprising means for rotatably supporting a cylindrical blank, a tool, means for giving the tool motion longitudinally of the blank, means for adjusting the tool through an arc struck from the axis of the blank as a center, a design-cylinder, and a coöperating style connected to control the adjustment of the tool.

3. An automatic engraving-machine comprising supporting means for a cylindrical blank, means for giving the blank a step-by-step rotary feed, a tool, means for giving the tool motion longitudinally of the blank, and means for adjusting the tool through an arc struck from the axis of the blank as a center.

4. An automatic engraving-machine comprising a design-cylinder, a traversing style coöperating therewith, supporting means for

a cylindrical blank, means for giving the design and blank cylinders a step-by-step rotary feed in unison, a tool, means for adjusting the tool through an arc struck from the axis of the blank as a center, and interposed mechanism through which the adjustment of the tool is controlled by the style.

5. An automatic engraving-machine comprising means for rotatably supporting a cylindrical blank, a tool movable through an arc struck from the axis of the blank as a center, a lever connected in parallel relation to the tool, a design-cylinder, a coöperating traversing style, and a connection between the style and lever through which motion of the tool is controlled.

6. An automatic engraving-machine comprising means for rotatably supporting a cylindrical blank, a tool, a guide concentric with the blank on which the tool is movable, a pivoted lever, links connecting the lever in parallel relation with the tool, a design-cylinder, a coöperating traversing style, and a connection between the style and lever through which motion of the tool upon the guide is controlled.

7. An automatic engraving-machine comprising supporting means for a cylindrical blank, a spring-advanced tool, a guide concentric with the blank on which the tool is adjustable, a gage for regulating the depth of cut of the tool, a pivoted lever, links connecting the lever in parallel relation with the tool, a design-cylinder, a coöperating traversing style, and a connection between the style and lever through which motion of the tool upon the guide is controlled.

8. An antomatic engraving-machine comprising supporting means for a cylindrical blank, a spring-advanced tool, a gage for regulating the depth of cut of the tool, a guide concentric with the blank, a tool-supporting member movable on the guide, a pivoted lever, connecting-links between said member and lever, an automatic trip for giving the tool motion in opposition to the spring by which it is advanced, a design-cylinder, a coöperating traversing style, and a connection between the style and said pivoted lever through which motion of the tool-supporting member upon the guide is controlled.

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

PAUL VICTOR AVRIL.

Witnesses:

J. E. PEARSON,

FRANK O'CONNOR.