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J. T. AUSTIN.
ENGRAVING MACHINE.

APPLICATION FILED SEPT. 19, 1902.

NO MODEL.

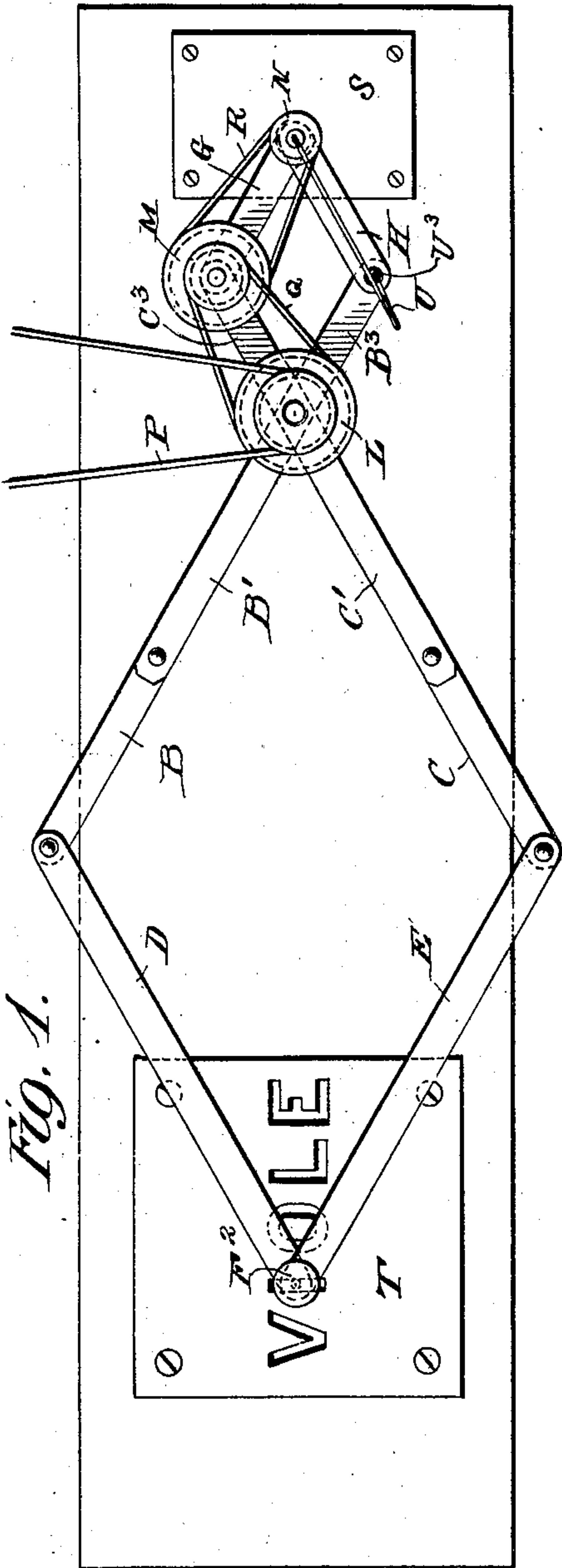


Fig. 1.

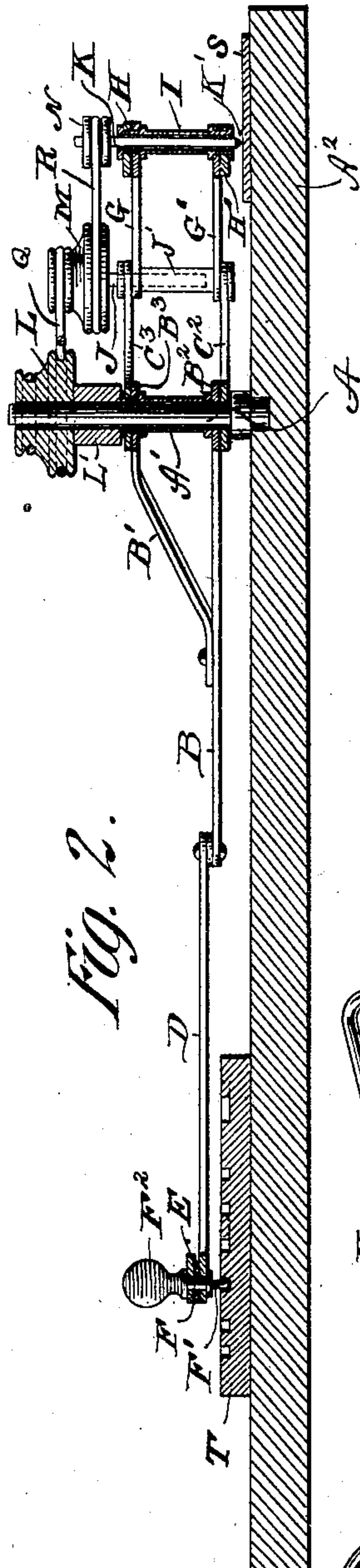


Fig. 2.

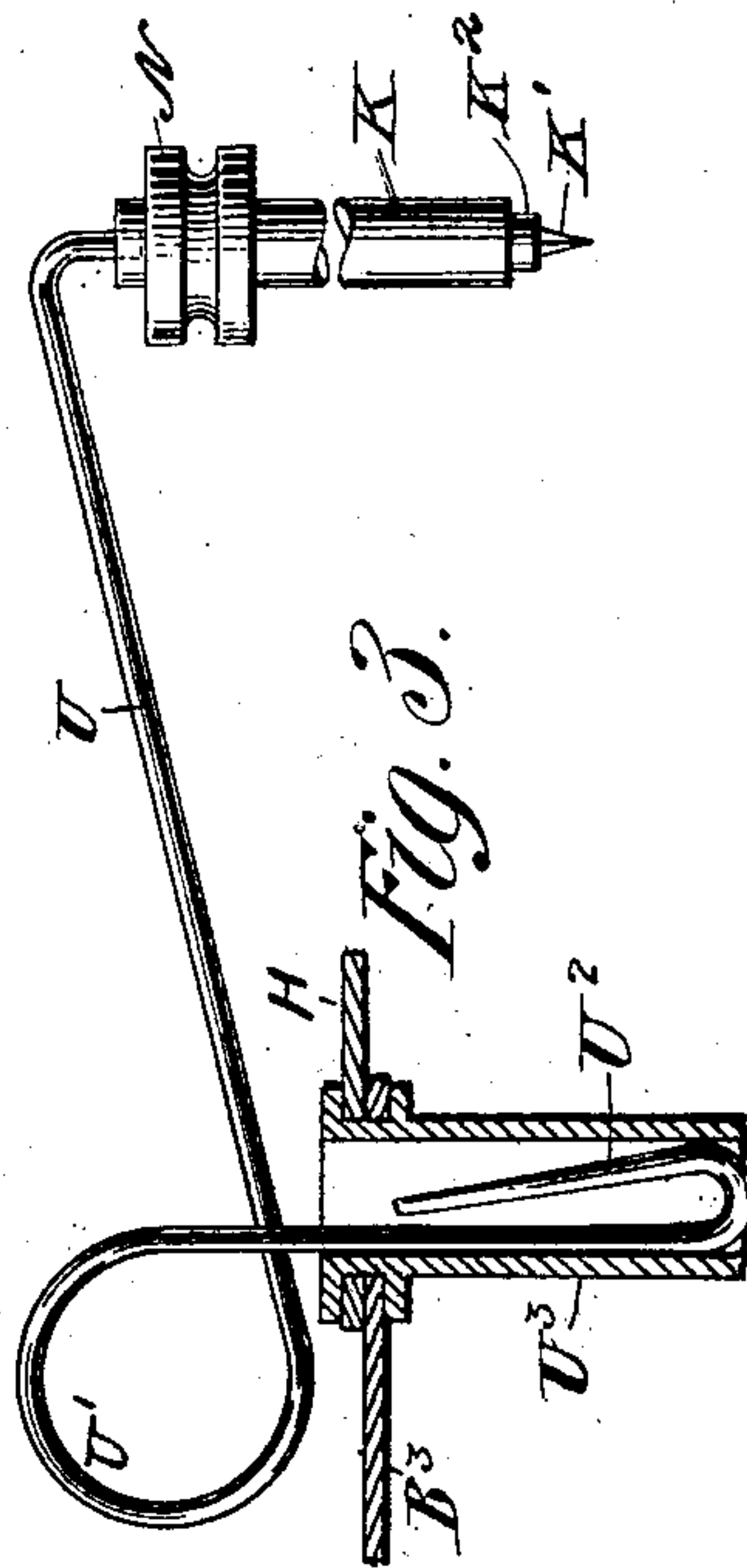


Fig. 3.

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ENGRAVING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 732,694, dated July 7, 1903.

Application filed September 19, 1902. Serial No. 124,049. (No model.)

To all whom it may concern:

Be it known that I, JOHN TURNELL AUSTIN, a citizen of the United States, residing at Hartford, Hartford county, Connecticut, have
5 invented certain new and useful Improvements in Engraving-Machines, of which the following is a full, clear, and exact description.

My invention relates to engraving-machines.

Among the main objects of my invention are simplicity of construction, accuracy, economy, and durability of operation.

The apparatus, as shown in the accompanying drawings, is a preferred embodiment
15 of this invention.

In the drawings, Figure 1 is a plan view of my invention. Fig. 2 is a longitudinal sectional elevation. Fig. 3 is a side elevation
20 and section showing a detail of construction.

A is a pivotal mounting or shaft supporting the apparatus. B is an arm pivoted thereon and reinforced by an arm B'.

C is an arm similar to B, and C' is a reinforcing-arm therefor.

D is an arm pivoted to B.

E is an arm pivoted to C.

The arms D E are pivotally connected at F.

F' is tracer-point located, preferably, at the
30 connection F.

F² is a handle by which the tracer-point F' may be moved.

As is usual in pantographic apparatus, the arm D is parallel with the arm C, and the
35 arm E is parallel with the arm B. The arms B C and their reinforcing parts B' and C', respectively, extend beyond the pivotal support A to form the extensions C² C³ and B² B³. The arms B and C and their reinforcements
40 B' and C' are connected by a sleeve A', which surrounds the shaft or post A. The members or extensions C² C³ have pivoted to them links G G'. B² B³ have the links H H' pivoted to them. H H' and G G' are pivotally
45 connected to each other by the sleeve I. The pivotal connection between the links C² C³ and B² B³ is preferably hollow, so as to form a bearing for the shaft A. Similarly the parts C³ C² and B³ B² are connected by hollow sleeves J' and U³ to the arms G G' and
50 H H', respectively. The shaft J fits in the

sleeve J' and supports a pulley M. The shaft K carries a cutter K' and supports a pulley N.

L is a driving-pulley loosely mounted on
55 the center shaft A and resting on the collar L'.

P is the driving-belt leading to the pulley L and connected with a suitable source of power. (Not shown.)

Q is a belt leading from the pulley L to the pulley M, and R is a belt leading from the pulley M to the pulley N. The pulleys may have bearing-surfaces for the belts of any
65 desired ratio, so that the speed of the cutter may be anything desired relatively to the speed of the pulley L. As shown in the drawings, the proportions are such that the speed of rotation of the pulley N and shaft K will be multiplied relatively to the speed of rota-
70 tion of the pulley L.

At the lower end of the shaft K is located the cutter K'. (Best shown in the detail view, Fig. 3.) This cutter is adapted to project into and cut the material of a block S,
75 which may be suitably fixed, as to the base-plate A². Into the block S the design of the pattern T may be worked by means of the cutter K'.

The pulley L and shafts J and K are preferably so mounted as to be not only revol-
80 utable, but longitudinally movable, so that when the machine is in operation the belts will lead in a proper line from one pulley to the other, the said pulleys adjusting themselves to effect this proper alinement. The pulley N
85 may be heavy, so that the force of gravity may be employed to cause the cutter K' to project into the block of material S. A spring U is preferably employed to cause the desired
90 pressure of the cutter against the material of the block S. This spring is doubled at one end U² to provide a sliding frictional engagement on the interior of the sleeve U³. The coil-spring U' increases the pressure, which
95 may be applied to the cutter-shaft. By adjusting the position up and down of the part U² in the sleeve U³ the pressure may be varied, as desired.

K² is a shoulder carried by the shaft K and
100 adjacent the cutter K', which shoulder is elevated above the point of the cutter the dis-

tance that it is desirable to have the cutter project into the material of the block S. In use the cutter works into the material until the shoulder K² engages the surface of the said block S, which acts as a check to give a uniform depth to the design being produced.

Before starting the machine the stylus F' is placed upon the pattern T in any one of the desired positions from which the start is to be made. In operation the pulley L is revolved by means of any suitable power, as desired, and through the medium of the pulleys M N and the belts Q R the cutter-shaft K is revolved. In the form shown the pattern or templet contains a design representing the word "Viole." The operator would probably begin by placing the stylus in the upper left-hand portion of the letter "V." The cutter is then lowered until it bears against the block, which is secured in the proper position. If desired, the spring U may be applied to force the cutter-point against said block. Power is then applied, causing the cutter to revolve, which immediately works into the block S until the shoulder K² engages the surface. The operator then causes the stylus to trace the letter "V," which the cutter reproduces on a smaller scale in the block S, (the action of the mechanism being pantographic.) When the letter "V" is completed, the cutter is elevated. The stylus is then moved to the next letter that it is desired to reproduce, and the operation previously described is repeated. This is kept up until the full design has been reproduced in the block S. From the foregoing it will be plain that in this simple manner any desired design may be reproduced in a block of any desired material.

The invention is particularly useful in engraving such words and characters as used in connection with organ-stops, it being only necessary to have one pattern or templet of the desired word to enable an operator to reproduce with exact uniformity as many similar stop-faces as desired. In the form shown the pattern is substantially larger than the finished design; but the size of the pattern relatively to the size of the finished product is variable and depends entirely upon the relative length of the various parallel arms. In engraving the face-plates of organ-stops in the past it has been customary to have the same done by hand, and it has been found impossible to obtain exact uniformity. By the use of the apparatus herein described exact uniformity is obtainable, and hence the appearance of the instrument is correspondingly improved.

The particular arrangement of the arms and their reinforcements is of great advantage in that it causes a rigidity and positiveness of action otherwise unattainable. The stylus may be raised from the pattern without affecting the cutter, since there may be sufficient spring in the arms B, C, D, and E, while the cutter-carrying frame is rigid. By mounting

the pulleys and their respective shafts coincident with the axes of the pivotal connecting-belts the tension of the various belts is always uniform irrespective of the position of the parts. By having the shafts for the pulleys longitudinally movable as well as revoluble unnecessary friction and the danger of the belts running off are avoided. This is of particular advantage where the block S, in which the pattern is to be reproduced, possesses an irregular surface requiring the cutter-shaft to be elevated and depressed as it traverses said surface. By making the pulleys and shafts longitudinally movable as well as revoluble they may be removed and new ones substituted. This permits the varying of speed ratios and the changing of the cutter as the needs require.

Inasmuch as the entire apparatus may rise on shaft A and inasmuch as shaft K may work up and down in its bearing-support it is possible to work on blocks S of varying thickness without manually readjusting the machine. This also obviates the necessity of having the pattern and work-block of standard thickness always bearing a uniform ratio to each other. The frame may be removed from the post or shaft A and a washer slipped on to raise the parts at any distance from the base A². Other pantographic frames of different ratios of reduction may be substituted and used on the same base.

While I am aware that pantographic action is old in some connections, the particular application of the same herein and the construction of the apparatus set forth embody new and useful features capable of producing new and unforeseen results.

What I claim is—

1. In an apparatus of the character described, a plurality of links, a main pivotal support for said links, located intermediate thereof, the links on one side of said support being double throughout and only partially so on the other side of said support, a rotatable cutter mounted concentrically with one of the hinged connections for said links, a stylus carried by another of the said links, a driving-pulley concentric with the main pivotal support, a pulley upon the shaft of said cutter and a means intermediate of said pulley for transmitting any rotary action of the driving-pulley to the cutter-shaft.

2. In an engraving-machine, a pantographic frame, a main pivotal support, the frame on one side of said support being flexible and on the other side of said support inflexible, a stylus on one side of said support and carried by the flexible portion of said frame, a rotary cutter on the other side of said support and carried by said frame, a main driving-pulley concentric with said main pivotal support, a pulley concentric with said cutter, and an intermediate pulley and means for holding said intermediate pulley always at a uniform distance from said driving-pulley and said cutter-pulley.

3. In an apparatus of the character described, the arms D, E, arms B, C, pivoted thereto, reinforcing-arms B', C', a sleeve A' connecting said arms B B' and C C', the links
5 G, G' and H, H' pivoted to extensions from C', C and B', B and pivoted together by the sleeve I.

4. In an apparatus of the character described, a pantograph, a frame reinforcing
20 the same, a hollow sleeve-like pivotal connection for a joint thereof, a shaft therein and a pulley mounted on said shaft and longitudinally movable.

5. In an apparatus of the character described, a pantograph, hollow sleeves carried
15 at the pivotal connections of some of the arms thereof, a rotatable cutter-shaft mounted in one of said sleeves, an adjustable spring-arm mounted in another of said sleeves for the
20 purpose of applying pressure on said cutter-shaft.

6. In an apparatus of the character described, a pantograph, hollow sleeves carried
25 at the pivotal connections of some of the arms thereof a rotatable cutter-shaft mounted in

one of said sleeves, an adjustable spring-arm mounted in another of said sleeves for the purpose of applying pressure on said cutter-shaft, and a main driving-pulley pivotally
30 mounted on a shaft situated in another of said sleeves.

7. In an apparatus of the character described, a pantograph, hollow sleeves carried
35 at the pivotal connections of some of the arms thereof, a rotatable cutter-shaft mounted in one of said sleeves, an adjustable spring-arm mounted in another of said sleeves for the purpose of applying pressure on said cutter-shaft, and an intermediate pulley mounted
40 on a shaft in another of said sleeves.

8. In a device of the character described, a frame, a longitudinally-rotatable cutter and a spring U for engaging said cutter, said spring having a coil U' and a bent-up end
portion U².

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Witnesses:

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