Nov. 5, 1929. R. E. GRAY 1,734,573

PANTOGRAPHIC REPRODUCING APPARATUS

Filed Feb. 6, 1926 4 Sheets-Sheet 1

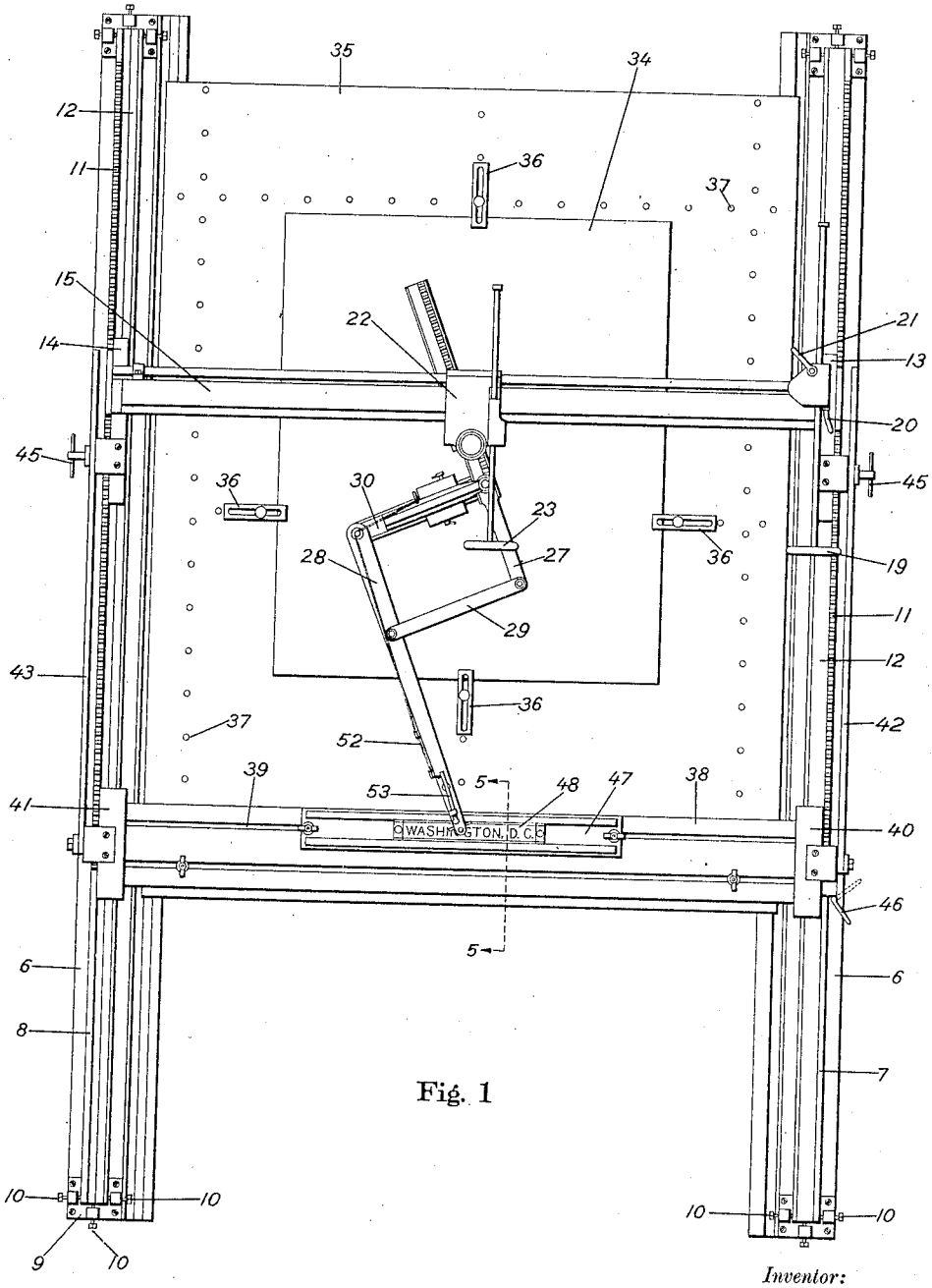


Fig. 1

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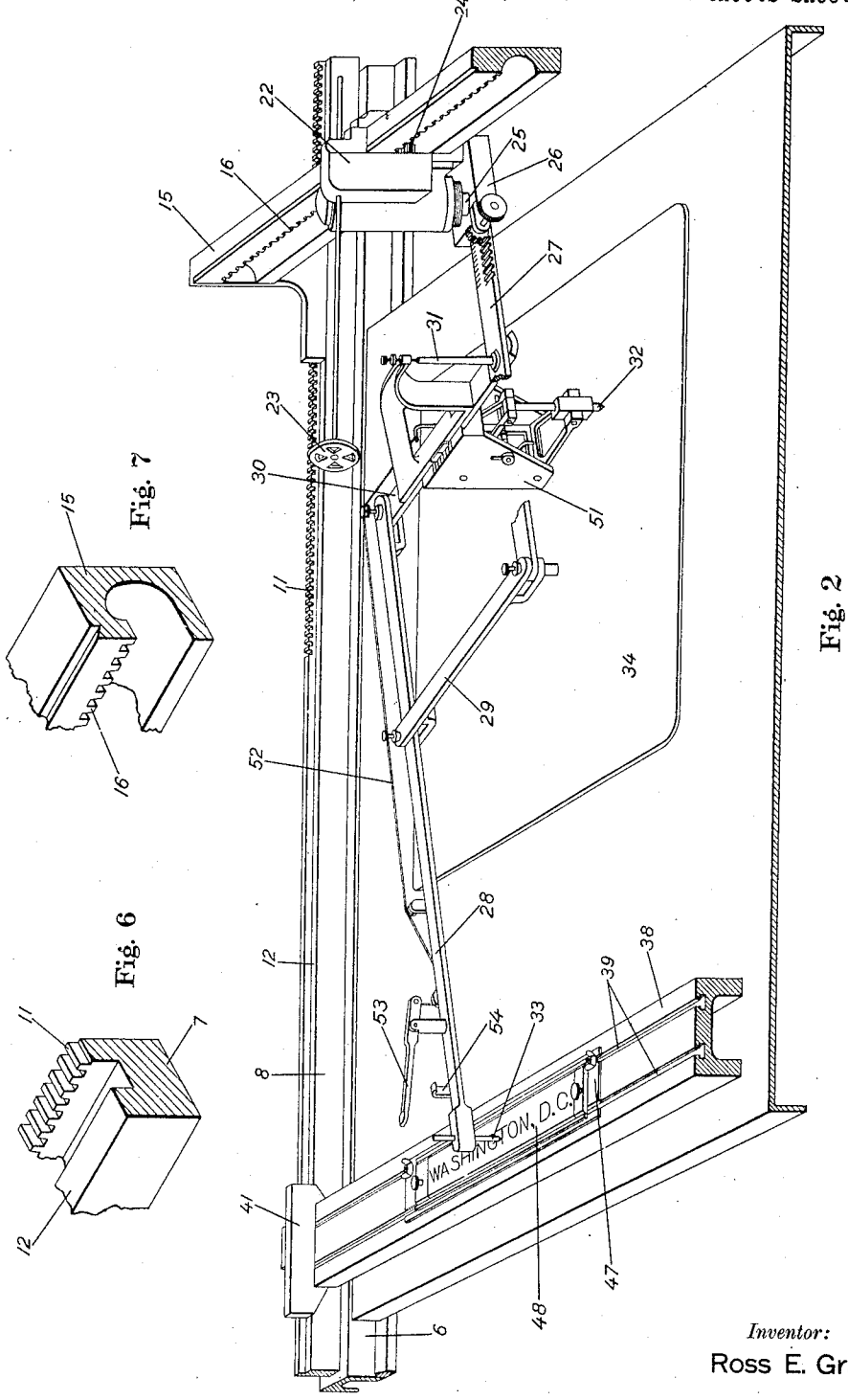


Fig. 2

Fig. 7

Fig. 6

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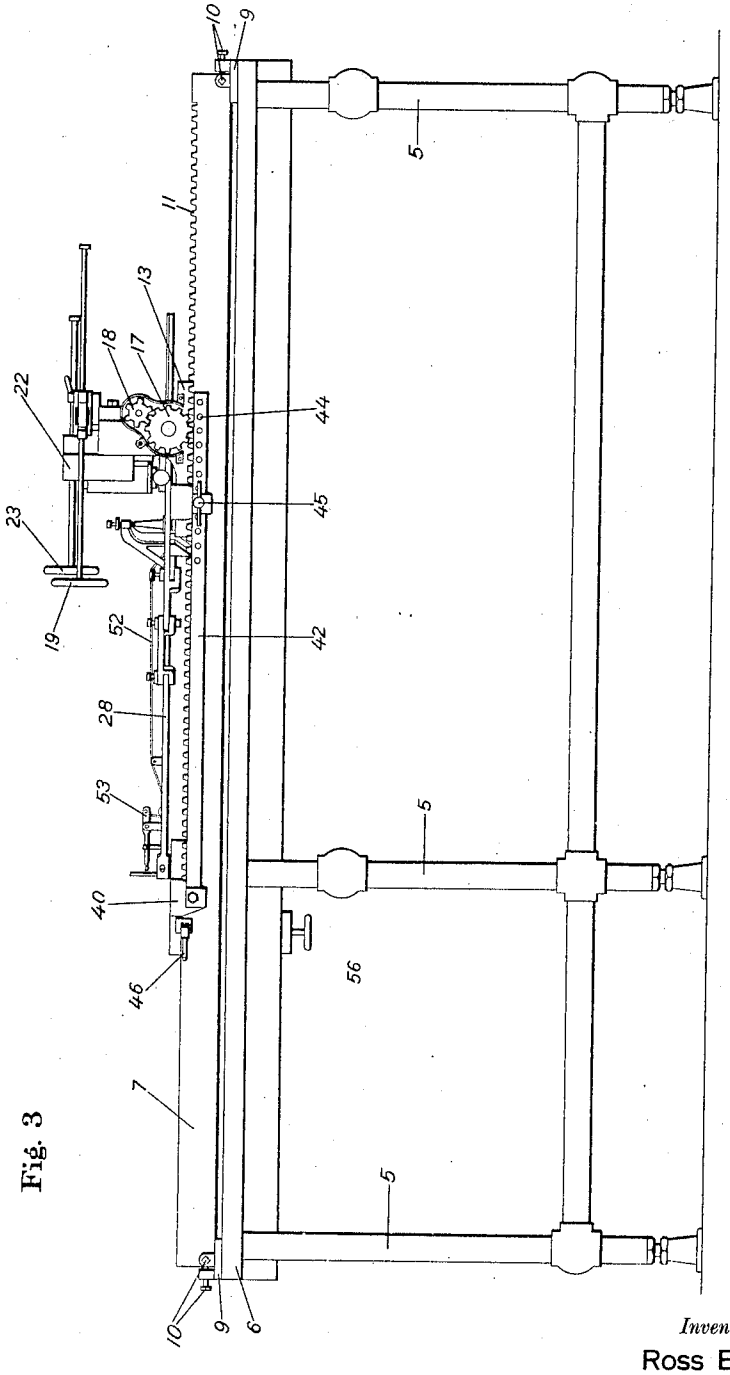


Fig. 3

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PANTOGRAPHIC REPRODUCING APPARATUS

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Fig. 4

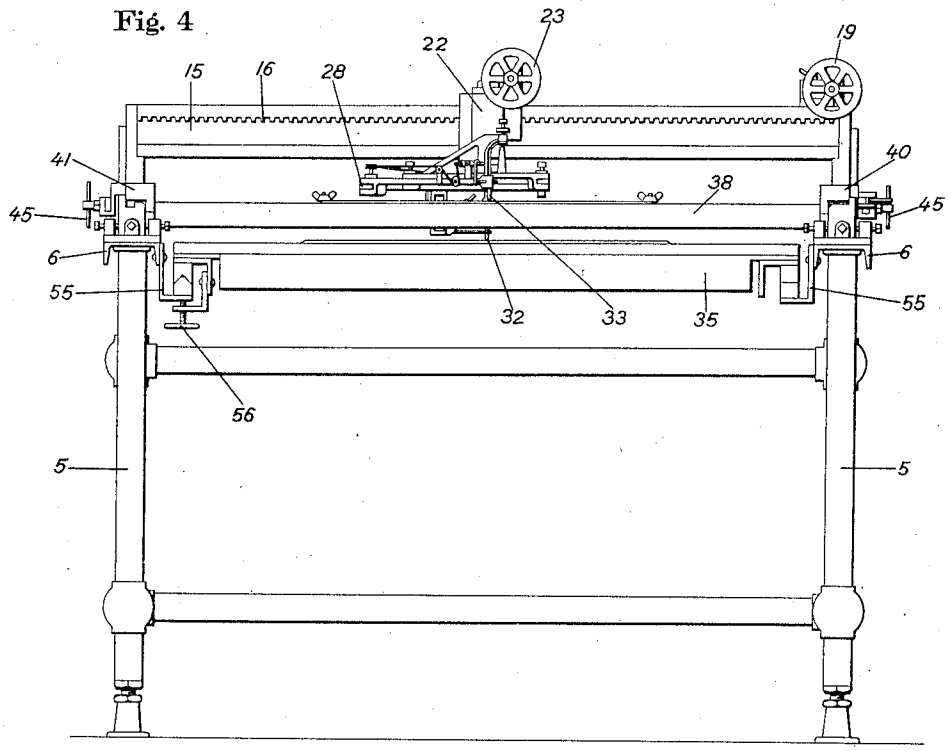
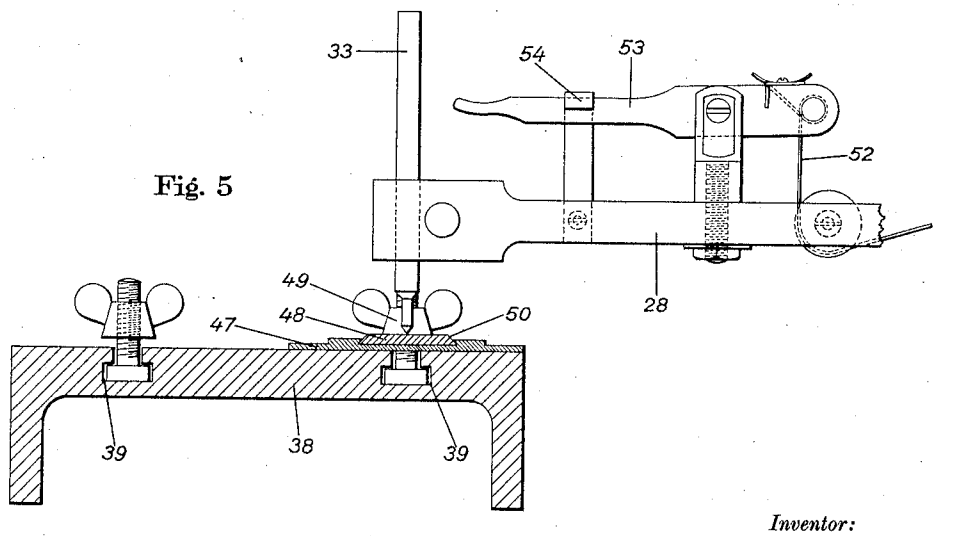


Fig. 5



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UNITED STATES PATENT OFFICE

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PANTOGRAPHIC REPRODUCING APPARATUS

Application filed February 6, 1926. Serial No. 86,536.

(GRANTED UNDER THE ACT OF MARCH 3, 1883, AS AMENDED APRIL 30, 1928; 370 O. G. 757)

My invention relates broadly to a reproducing apparatus and more particularly to an apparatus for reproducing letters, characters, symbols or ciphers.

An object of the invention is to provide an apparatus of the character described employing a linked arm pantograph utilizing a pattern for controlling the movement of the reproducing instrument.

Another object is to provide a reproducing apparatus in which the pattern and reproducing instrument may be moved in unison over a plate on which the pattern is to be traced without disturbing the adjustment of the pantograph.

The invention further contemplates movement in unison of the reproducing instrument and the pattern over a surface of large extent.

With the above and other objects in view the invention consists in the construction, combination and arrangement of parts as will be hereinafter more fully described.

Reference is to be had to the accompanying drawings forming part of this specification in which like reference characters indicate corresponding parts throughout the several views, and in which,

Figure 1 is a plan view of my invention,

Figure 2 is an isometric view of Figure 1 partly in section,

Figure 3 is a side elevation thereof,

Figure 4 is a front end view,

Figure 5 is an enlarged sectional view on the line 5—5 of Figure 1.

Figure 6 is a fragmentary view of a detail, and

Figure 7 is a similar view of another detail.

Referring more particularly to the drawings, a frame, consisting of supporting members 5 and parallel base members 6, supports rails 7 and 8 that are of equal length and parallel with their ends resting in castings 9 fastened to the base members. These castings are designed to support the rails at a distance above the base members sufficient to permit a copper chart plate placed on the base members to pass under the rails. The castings are also provided with adjusting screws 10 bearing against the sides and ends of the rails to permit of their adjustment that they might be perfectly parallel and have their ends exactly even. The rails are substantially U-shaped in cross section with one side of the U of greater length than the other, as may be more clearly seen in Fig. 6. A portion of the longer side is provided with a rack 11, while the other side is provided with a machined surface 12.

Carriages 13 and 14 rest on roller bearings on the surfaces 12 of the rails and are bolted to and support a horizontal cross-bar 15 at right angles to the rails. This bar is of the cross-section shown in Fig. 7 and is provided with a depending rack 16.

Gear wheels 17 that engage with the racks 11 are mounted on the outer sides of the carriages 13 and 14. Smaller gear wheels 18 engage with the gears 17, motion being imparted thereto by a hand wheel 19 which is connected with the small gears by shafts (not shown). The ratio of the gears 17 and 18 is such that operation of the hand wheel will move the carriage very slowly along the rails. Should, however, it be desired to move the carriage more rapidly, a catch 20, engaging the wheel 19 with the gears 18, may be released permitting free movement. As any type of catch suitable for the purpose may be employed, I do not desire to limit myself to any particular construction. By releasing a catch 21, hand wheel 19 and shaft are free to swing about, thus bringing the wheel into easy reach of the operator.

A cross head 22 which carries a train of gears (not shown) is movable along the cross-bar 15 and is operated by a control wheel 23, causing one of the gears 24 of the train gears (Fig. 2) to move along the rack 16. The cross head carries on its face a vertical shaft 25 which is free to revolve on ball bearings. The lower end of the shaft operates through a block 26 attached to the cross bar 15 and which fits and allows the arm 27 of a pantograph to pass therethrough, thus providing a support for the pantograph at its anchor point.

As the pantograph is of the type disclosed in my Patent No. 1,069,652, granted August 5, 1913, it is not thought necessary to give a description of its details herein, other than to

point out that it includes arms 27, 28, 29, and 30, anchor point 31, cutting point 32, and tracing point 33. The anchor point and hence the cutting point may be brought to any position on a piece of work, such as a copper plate 34, placed on the base 35, between the members 6 by the proper operation of the wheels 19 and 23. The work is made secure to the base by clamps 36 which are inserted in the openings 37 dispersed about the base to permit of adjustment for different sized work.

A pattern support 38, provided with slots 39 is secured to carriages 40 and 41 which rest on ball bearings on the machined surfaces 12 of rails 7 and 8. Bars 42 and 43 connect carriage 40 with carriage 13 and carriage 41 with carriage 14 respectively. These bars are provided with openings 44, Fig. 3, into which fit locking pins 45, which may be so placed along the bars that the distance between the pattern support 38 and cross bar 15 may be varied, and parallelism between these two members may be maintained. The pattern support and cross bar may be firmly locked in adjusted position by a catch 46 carried by the carriage 40. Pattern holders 47 that hold patterns 48 are placed on the pattern support 38 and are fastened in position by clamps 49 fitted in the slots 39. The edges 50 of the patterns are bevelled to fit in a slot in the holder, more clearly seen in Fig. 5. The patterns are in various styles of type and letters are so placed in relation to the sides of the pattern that when placed together in forming words the proper spaces between letters are automatically obtained.

The cutting, or engraving tool, 32, is suspended in a vertical position on horizontally spaced arms in the tool carriage 51 that is movably mounted on the pantograph arm 30. The tool or point is raised off or lowered onto the work by means of a cable 52 that runs to a finger latch 53 on the arm 28 adjacent to tracing point 33. By slipping the latch under a holder 54, the point is held in a raised position when the machine is not in use.

The dimensions and elevations of the various parts of the machine are so proportioned that when letter patterns are placed on the pattern support and traced with the tracing point of the pantograph the cutting point will engrave the letters on a copper plate or work resting on the base.

The base 35 is supported from the members 6 by brackets 55 and is locked in position by a screw 56.

In using my machine the copy is first laid out on a chart plate on which the outlines have already been engraved. This is accomplished by coating the plate with a thin layer of shellac and drawing on the surface the position of either the beginning, the end, or the center of each line of lettering required, also the position of the bottom line of the lettering. The plate is then placed and securely fastened on the base of the machine in such a position that the top and bottom border lines of the plate are parallel to the pattern support and the cross bar. Arm 27 of the pantograph is moved through the block 26 and the cutting point carriage 51 is moved on the arm 30 to the appropriate settings for the gage of the letters required. The appropriate patterns for a line of lettering are set up and clamped in the pattern holder which in turn is placed and clamped on the pattern support. The tracing point is placed on the bottom line of letters on the patterns and the cutting point is brought to the corresponding bottom line of the plate by means of the hand wheels 19 and 23. The pattern holder is then moved to the right or left until the cutting point is in its correct position for engraving. The operator then traces the letters of the patterns lowering the cutting point for each stroke of the letters and raising it between strokes. The depth of the engraved letters may be controlled by placing various weights on the arms supporting the cutting point.

It is understood that the above description and accompanying drawings comprehend only the general and preferred embodiment of my invention and that various minor changes in details of construction, proportion and arrangement of parts may be made within the scope of the appended claims and without sacrificing any of the advantages of my invention.

The invention herein described may be manufactured and used by or for the Government of the United States for governmental purposes without the payment to me of any royalty thereon.

Having thus described my invention, what I claim as new is:

1. A reproducing machine comprising in combination, a work support, a pattern support, a crossbar spaced from the pattern support parallel thereto, a carriage supported on and movable along the crossbar, a pattern-guided reproducing means supported by the carriage and operable over the work and the pattern supports, means for synchronously moving the pattern support and crossbar longitudinally over the work support, and means for moving the carriage along the crossbar laterally over the work support without disturbing its position over the pattern support.

2. A reproducing machine comprising in combination, a stationary work support, a pattern support movable longitudinally over the work support, a crossbar spaced from the pattern support parallel thereto and movable therewith, a carriage supported on and movable along the crossbar, a pattern-guided reproducing means supported by the carriage, and means for connecting the pattern support and crossbar for synchronous longitudinal movement.

3. A reproducing machine comprising in combination, a stationary work support, a pattern support movable longitudinally over the work support, a crossbar parallel with and adjustable toward and from the pattern support, means for synchronously moving the crossbar and pattern support longitudinally over the work support, means for connecting the two in their synchronous longitudinal movement, and a pattern-guided reproducing means movable along the crossbar laterally over the work support independently of the pattern support.

4. A reproducing machine comprising in combination, a work support, a pattern support, a linked-arm pantograph, a crossbar supporting the pantograph, the pattern support and crossbar being synchronously movable longitudinally over the work support, the pantograph being independently movable laterally along the crossbar, and means connecting the pattern support and crossbar for controlling their synchronous longitudinal movement.

5. A reproducing machine comprising in combination, a work support, a pattern support movable longitudinally thereover, a crossbar spaced from the pattern support parallel thereto and movable toward and from said support, a linked-arm pantograph mounted on the crossbar and movable therealong laterally over the work support, means for moving the pattern support and crossbar in unison, and means for laterally moving the pantograph independently of the pattern support.

6. A reproducing machine comprising in combination, a work support, a pattern support longitudinally movable over the work support, a crossbar spaced from and movable with the pattern support parallel thereto, a pattern-guided reproducing means carried on the crossbar, and means for adjustably connecting the pattern support and crossbar desired distances apart and for controlling their synchronous longitudinal movement.

7. A reproducing machine comprising in combination, a base, parallel guideways carried by the base, a work support mounted on the base, a pattern support and crossbar slidably mounted on the guideways and movable longitudinally over the work support, patterns removably carried by the pattern support a reproducing means carried by and movable along the bar over the work support, and means connecting the pattern support and bar for their synchronous movement over the work support.

ROSS E. GRAY.