Nov. 20, 1923. 1,474,924

E. APPELQUIST

RULE FORM MACHINE

Filed Oct. 28, 1921 3 Sheets-Sheet 1

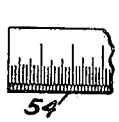


Fig. 4

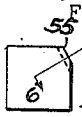


Fig. 5



Fig. 6

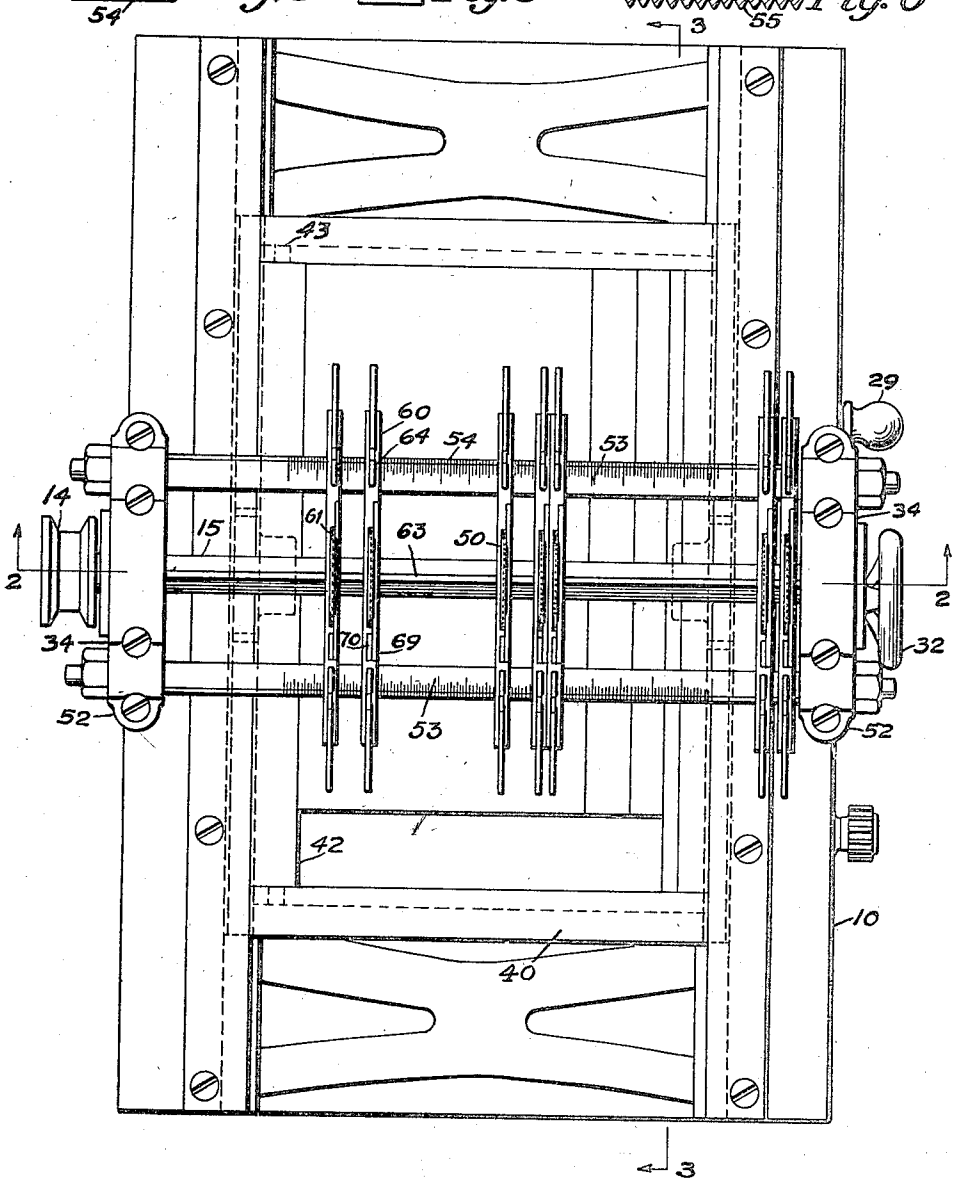


Fig. 1

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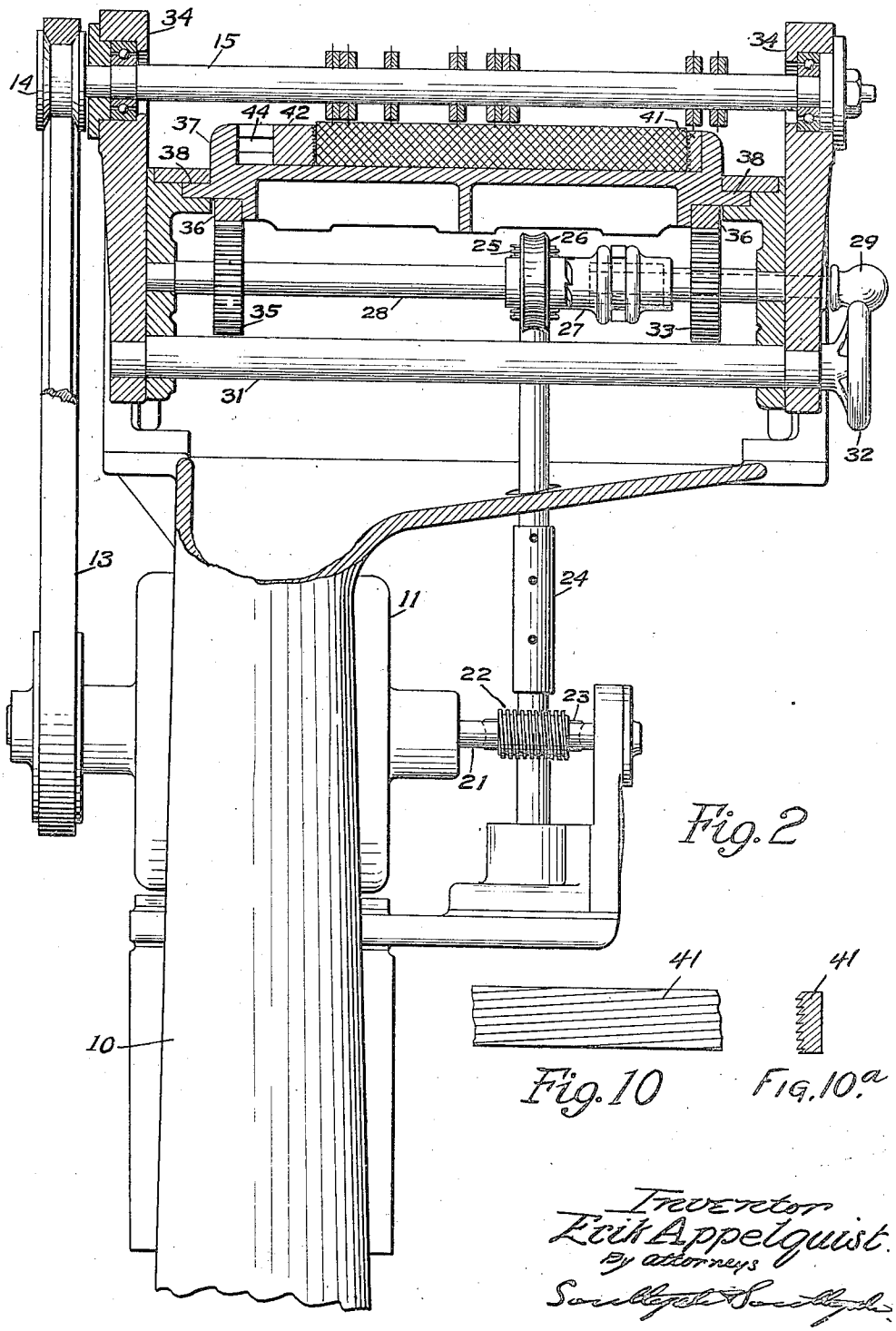


Fig. 2

Fig. 10

Fig. 10a

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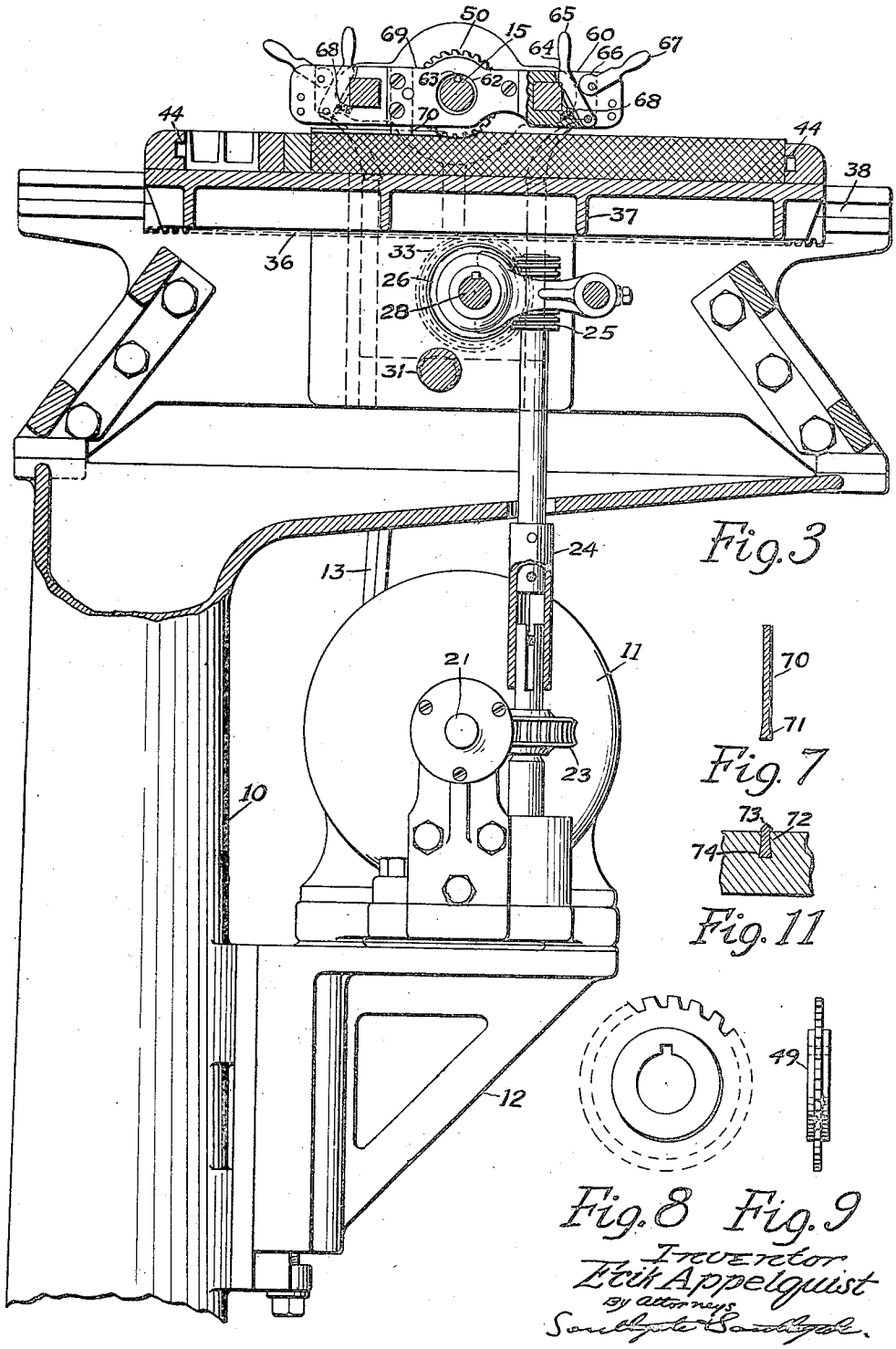


Fig. 3

Fig. 7

Fig. 11

Fig. 8 Fig. 9

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UNITED STATES PATENT OFFICE.

ERIK APPELQUIST, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO RULE FORM MACHINE COMPANY, A CORPORATION OF MASSACHUSETTS.

RULE-FORM MACHINE.

Application filed October 28, 1921. Serial No. 511,215.

To all whom it may concern:

Be it known that I, ERIK APPELQUIST, a subject of the King of Sweden, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Rule-Form Machine, of which the following is a specification.

This invention relates to the slotting and grooving of the faces of casting machine slugs or lines of type for use in printing tabular work. These slugs are set up on a type casting machine in block, associated in such manner as may be necessary to produce the particular form of tables desired, and then they are grooved transversely. In these grooves are inserted metallic rules, wires or strips, the front edges or faces of which constitute printing surfaces for printing lines between the columns. Obviously these rules, and therefore the grooves, have to be spaced at different distances apart for different kinds of tabular work. All the above is well known.

The principal objects of this invention are to provide a machine for performing this grooving operation which will be very compact and yet will be especially efficient for the purpose intended and, more specifically, to provide an improved form of readily adjustable carriages for the milling cutters and broaches and an improved and more convenient method of driving the same in their different adjusted positions; to provide an accurate and efficient way for supporting the carriages independently of the arbor which rotates the milling cutters and for facilitating the spacing of the milling cutters and broaches the proper distances apart; to provide for vertically adjusting the cutter arbor and carriage; to provide means connected therewith for widening the bottoms of the slots so that rules wider at the base than in the body can be inserted and thus there will be no danger of their displacement even after the type has been handled; and to provide an improved printing rule form from which the rules cannot be removed by a transverse motion.

The invention also involves other improvements and features of other parts of the machine as will appear.

Reference is to be had to the accompanying drawings in which—

Fig. 1 is a plan of a machine constructed in accordance with this invention;

Fig. 2 is a transverse vertical sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a longitudinal vertical sectional view on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged fragmentary plan of one of the milling cutter carriage supports showing its scale;

Fig. 5 is an end view of the same;

Fig. 6 is a sectional detail on the line 6—6 of Fig. 5 showing the spacing grooves;

Fig. 7 is a transverse sectional view of the grooving broach on an enlarged scale;

Figs. 8 and 9 are a side and an edge view of the milling cutter;

Fig. 10 is a side view of one of the jaws;

Fig. 10^a is a section thereof; and

Fig. 11 is a transverse sectional view of a portion of the type with one of the rules or strips set therein.

I have shown the machine in a compact form in which it is mounted on a base or frame 10. The machine is run by a motor 11 mounted on a bracket 12 attached to the base. The bracket is adjustable on the base so as to keep the belt 13 driven from the motor sufficiently stretched. This belt drives a pulley 14 on the cutter arbor 15.

On the other end of the motor shaft 21 is a worm 22, which drives a worm gear 23 attached to a vertical telescoping shaft 24. On the vertical shaft is a worm 25 driving a worm gear 26 provided with a clutch 27 operated by a handle 29, to engage and disengage a feed gear shaft 28. This is provided with gears 33 and 35 engaging racks 36 on the table 37, which moves very slowly. The arbor 15 is mounted on ball bearings in adjustable slides 34 in the sides of the frame 10 and extends across it above. Said slides are made adjustable, through a cam shaft 31 operated by a hand wheel 32, and provided with set screws for locking it. A switch for the motor is located in a convenient place in the side of the frame with the wiring in the hollow of the base 10.

The table closes the top of the frame between the ways 38 on which the table 37 reciprocates, so that most of the mechanism is entirely enclosed. It will be apparent that the table can be fed along in a manner similar to a planer table and that by operating the clutch 27 this motion can be interrupted or stopped.

On this table 37 is a frame or chase 40 which is provided with one stationary jaw

41 and one loose jaw 42. Both of these jaws are provided along their gripping surfaces with longitudinal grooves in the form of teeth running on an incline to the table. The loose jaw has pivots 43 on both ends. Said pivots fit in slots 44 in the end pieces of a frame and move parallel with the table. These grooves thereby prevent the slugs at the end of the series from rising and therefore tend to prevent the rest of the slugs from bulging or rising from the table when they are clamped between them.

The milling operation is performed by a series of thin milling cutters each having a flat hub 49 on each side to give it a good bearing on the arbor. The adjustable slides 34 are provided with bearings for the arbor 15 and with bosses 52 projecting therefrom on the opposite sides. Mounted in the bosses and extending parallel with the arbor, and substantially at the level thereof, are two bars 53 which are shown as square. These bars are located in fixed position and constitute guides and measuring scales. For this purpose each bar is beveled off at 54 on the outer upper corner and this beveled surface is provided with V-shaped teeth 55. These teeth are spaced apart at any convenient distance, but for the purpose of ordinary tabular work in the art mentioned I prefer to space them $\frac{1}{6}$ of an inch from apex to apex. On the horizontal top of each bar is provided a scale having its division marks registering with the teeth. This is divided into picas, half-picas and two-points, picas with the longest scale mark, half-picas with a shorter scale mark and two-point with the shortest scale mark.

On these two bars 53 are located a convenient number of cutter carriages 60. The bars therefore constitute supports and guides for these carriages, the carriages being in the form of comparatively thin strips of metal having square openings therethrough for fitting the bars 53. Each carriage is provided with a central vertical space 61 and with a central circular horizontal perforation 62. The arbor 15 passes through the central perforation freely and without bearing upon it. The space 61 is for the reception of one of the milling cutters 50. Each of these milling cutters is provided with a key slot and the shaft is provided with a longitudinal key 63 extending substantially all the way across from bearing to bearing. This key projects into the key slot and the perforation 62 is large enough to permit it to rotate therein without touching its edges. It will be seen, therefore, that the carriages can be moved along their supporting bars 53 to any desired position. At all points in which they are in operative location above the type they will be positively rotated by the arbor 15.

On each end of each carriage is a pivoted lever 64 having V-shaped teeth for engaging in the teeth 55. It has a handle 65 for operating it. Located at the back of it is a swinging cam 66 for locking it in fixed position against the bar 53. This has a handle 67 for operating it. A spring 68 also acts to throw back the lever 64 from the bar 53 when released by the cam 66.

The central space 61 is formed by notching out the main body of the carriage and the cutter is held in position, in the form shown, by a detachable plate 69 secured over this notch at one side.

Located at the rear of the cutter is a broach 70. This is secured to the carriage in alignment with the cutter centrally throughout most of its height but at the bottom is widened out as shown at 71. The passage of the work under the cutter will result in providing a groove of uniform thickness in the work and the broach 71 widens it out at the bottom slightly. In this way an undercut groove is provided as indicated in Fig. 11.

The grooves are filled by inserting brass strips or rules 72 in them. These have one or more edges 73 for printing single or double column marks. They also have widened bottoms at 74 fitting in the grooves produced as above described. On account of this shape the rules cannot be dislodged readily and, in fact, cannot be dislodged at all except by longitudinal motion.

It will be seen that any desired number of these carriages can be employed and that they can be moved on the bars 53 readily and spaced at any desired distance apart, which will be shown on the scales. Their opposite ends can be spaced alike very easily by observing the scale. The mechanism shown will result in producing any desired number of undercut grooves throughout the block of slugs or lines of type carried by the frame.

Another feature of the invention, which is of importance in practical use, is that if the machine is kept running it will carry the carriage to one end until the racks 36 move out of mesh with the gears 33 and 35 and no damage will be done if the rest of the machine continues to run. Furthermore, by throwing out the clutch 27 the operator can move the carriage back and forth by hand along its ways. This is a matter of convenience to the operator.

In operation, the type, whether it is for printing characters or blanks, is set up in the frame as it will be needed for the printing operation just as it would be in the press. The cutter carriages are spaced the proper distances apart to provide the grooves in the right places and all the handles 67 set to hold the levers 64 in position to keep the carriages properly located. The arbor 15 may be running at this time ac-

cording to the convenience of the operator, but the handle 29 is kept in position to adjust the clutch 27. The frame 40 at this time is on the table 37 and the operator simply moves it up toward the arbor 15 until the racks 36 engage at their forward ends with the gears 33 and 35. Then he pushes in the handle 29 and the carriage is moved by power throughout the length of the machine in one direction to produce the desired grooves in the type. The operator then disconnects the clutch and draws the table back by hand and then takes out the type and replaces it by a new set.

Although I have described and illustrated only a single embodiment of the invention I am aware of the fact that many modifications can be made therein without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to all the details of construction herein shown and described but what I do claim is:—

1. In a machine for grooving line type or lines of type, the combination of a table for supporting said type, ways on which said table is movable, an arbor located over the table, a set of milling cutters on the arbor, said arbor having a key extending longitudinally thereof and engaging said milling cutters, means for moving the table longitudinally under the arbor, and a series of cutter carriages engaging said cutters respectively for adjusting them lengthwise of said arbor.

2. In a machine of the character described, the combination of a movable table for supporting slugs or the like, an arbor located adjacent to the table, means for moving the table adjacent to the arbor, a series of cutter carriages individually adjustable along the arbor and each having a cutter, said arbor having a key and each of the cutters having a slot for receiving it, whereby the arbor will rotate the cutters.

3. In a machine of the character described, the combination of a movable table for supporting slugs or the like, an arbor located over the table, means for moving the table under the arbor, a series of cutter carriages, a series of circular cutters movable with the carriages, each carriage having a passage therethrough for the arbor, said arbor having a key and each of the cutters having a slot for receiving the key, whereby the arbor will rotate the cutters, said cutter carriages being adjustable on the arbor to positions along the key, and means parallel to the arbor for guiding said carriages along it.

4. In a machine of the character described, the combination of a movable table for supporting type slugs or the like, a rotatable arbor mounted over the table having a key thereon, a pair of fixed guide bars adjacent to the shaft and parallel with it, a series of cutter carriages supported and guided by said guide bars, a rotatable cutter movable with each carriage and having a slot for engaging the key, said carriages being movable along the guide bars, whereby the cutters on the carriages that are located adjacent to the key will be rotated.

5. In a machine of the character described, the combination of a movable table for the type slugs or the like and an arbor, of a pair of guide bars located parallel with the arbor, each having a scale on the same, milling cutters on said arbor, and a series of cutter carriages having perforations of the same shape as said bars, by which they are supported and on which they are movable, said carriages having means for registering on said scales and showing their positions thereon.

6. In a machine of the character described, the combination of an arbor, a guide bar located adjacent and parallel thereto, said guide bar having a scale on its surface, a series of cutter carriages supported by the bar and having perforations for receiving the bar and arbor, means for registering on the scale to show the positions of the carriages thereon, and a rotatable cutter movable with each carriage and adapted to be rotated by the arbor.

7. In a machine of the character described, the combination of an arbor, a guide bar located adjacent and parallel thereto, said guide bar having a scale on its upper surface, a series of cutter carriages supported by the bar, having perforations for receiving the bar and arbor, a rotatable cutter movable with each carriage and adapted to be rotated by the arbor, said bar having teeth on its upper edge registering with said scale to cooperate with the carriages and assisting in holding them in their adjusted positions.

8. In a machine of the character described, the combination of an arbor, guide bars located adjacent and parallel thereto, said guide bars having scales located on their surfaces, a series of cutter carriages, supported by the bars, having perforations for receiving them, and provided with a rotatable cutter movable with each carriage and adapted to be rotated by the arbor, said bars being of general rectangular cross-section and having teeth on their upper edges registering with said scale and a registering device on each cutter carriage comprising a movable member thereon having edges adapted to engage in said teeth for holding the carriages in adjusted position and registering on the scales to show their positions thereon.

9. In a machine of the character described, the combination with an arbor, a guide bar, and a cutter carriage having a

space therein, of a cutter freely mounted in said space supported independently of the carriage, the cutter carriage having perforations for receiving the arbor and bar.

10. In a machine of the character described, the combination of guide bars and a cutter carriage having a space therein, a cutter in said space, the cutter carriage having a perforation for receiving an arbor and having perforations for receiving and fitting the guide bars, and means on the carriage for engaging the edges of the guide bars.

11. In a machine of the character described, the combination with an arbor, a guide bar, and a cutter carriage having a space therein, of a cutter in said space, the cutter carriage having a perforation for receiving the arbor and bar, a lever on the carriage for engaging the edge of the guide bar to hold the carriage, and a cam lever for engaging and holding said lever locked in position for holding the carriage against sliding along the bar.

12. In a machine of the character described, the combination with a guide bar, of a cutter carriage having a space therein, a perforation for receiving an arbor, and a perforation for receiving and fitting the guide bar, a lever on the carriage for engaging the edge of the guide bar, and means for holding said lever in fixed position against said edge, the edge of the guide bar having teeth equally spaced thereon, and the lever being shaped to enter the spaces between the teeth.

13. In a machine of the character described, the combination of an arbor, a cutter carriage having a space therein, a cutter in said space and adapted to be rotated by the arbor, the cutter carriage and cutter having perforations for receiving the arbor, and being slidable longitudinally thereon, and a grooving broach fixed on said carriage behind the cutter.

14. In a machine of the character described, the combination of a cutter carriage having a space therein, a cutter in said space, an arbor for rotating the cutter, the cutter carriage having a perforation for receiving the arbor, and a grooving broach fixed on said carriage behind the cutter, said grooving broach having a widened lower edge for widening the bottom of the slot cut by the cutter to form a groove with a wide bottom.

15. In a machine for grooving casting machine slugs or lines of type, the combination of a table having means for clamping said type, comprising a fixed and a movable jaw each having a flat face provided with downwardly slanting teeth for holding the slugs down positively, ways on which said table is movable, an arbor located over the table, a set of milling cutters on the arbor, and means for moving the table longitudinally under it and simultaneously rotating the arbor.

16. The combination with a table, of a pair of jaws thereon having opposite flat faces for receiving between them the clamping faces of said jaws having downwardly slanting teeth each located at an inclination all the way across the jaw for holding the slugs down.

In testimony whereof I have hereunto affixed my signature.

ERIK APPELQUIST.