March 11, 1930. M. FALK 1,750,218

KEY CUTTING MACHINE

Filed April 18, 1927 4 Sheets-Sheet 1

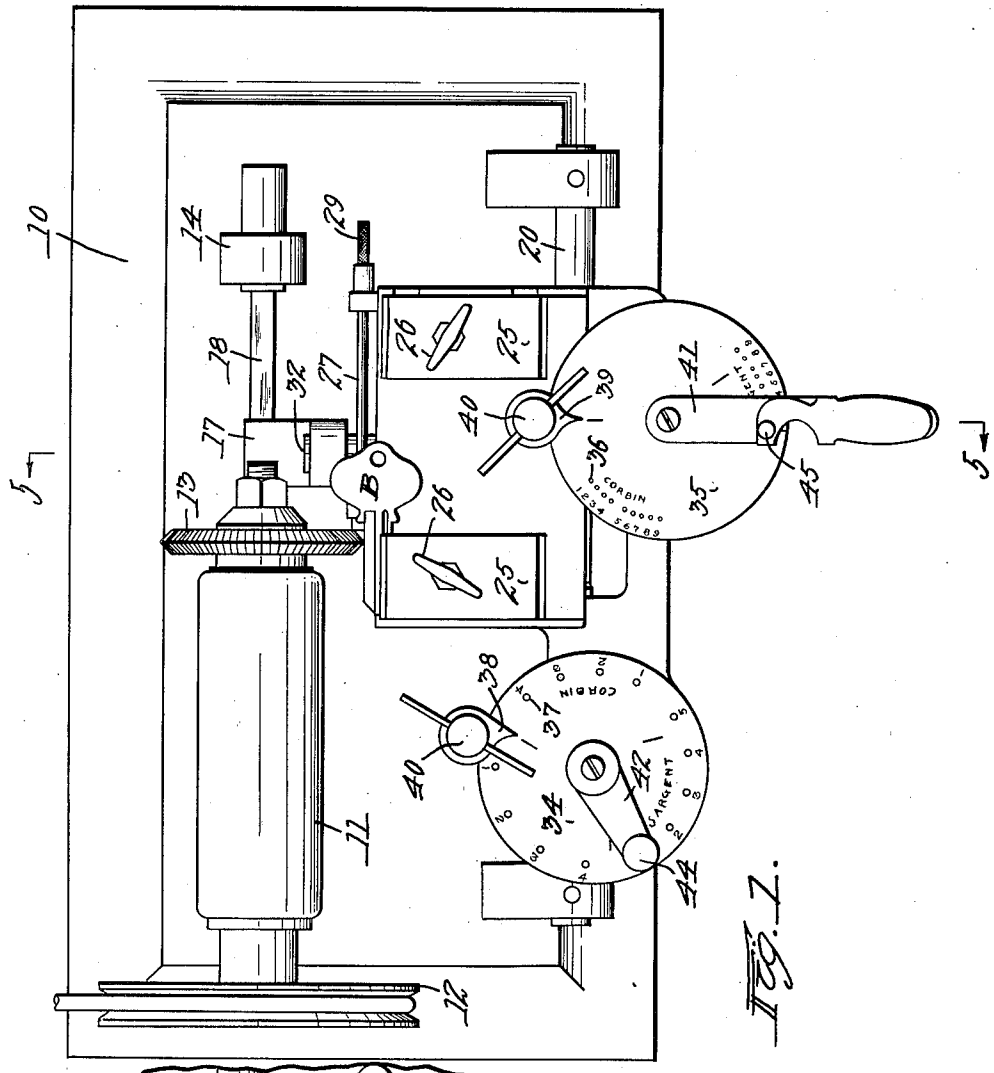


Fig. 1.

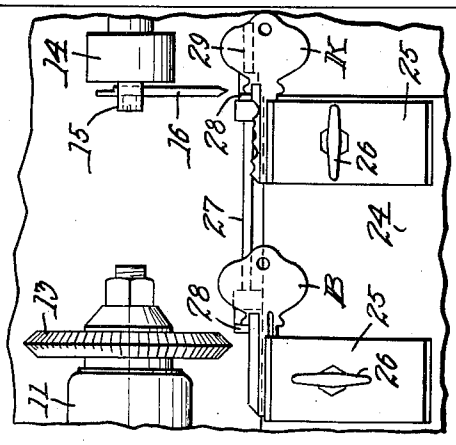


Fig. 2.

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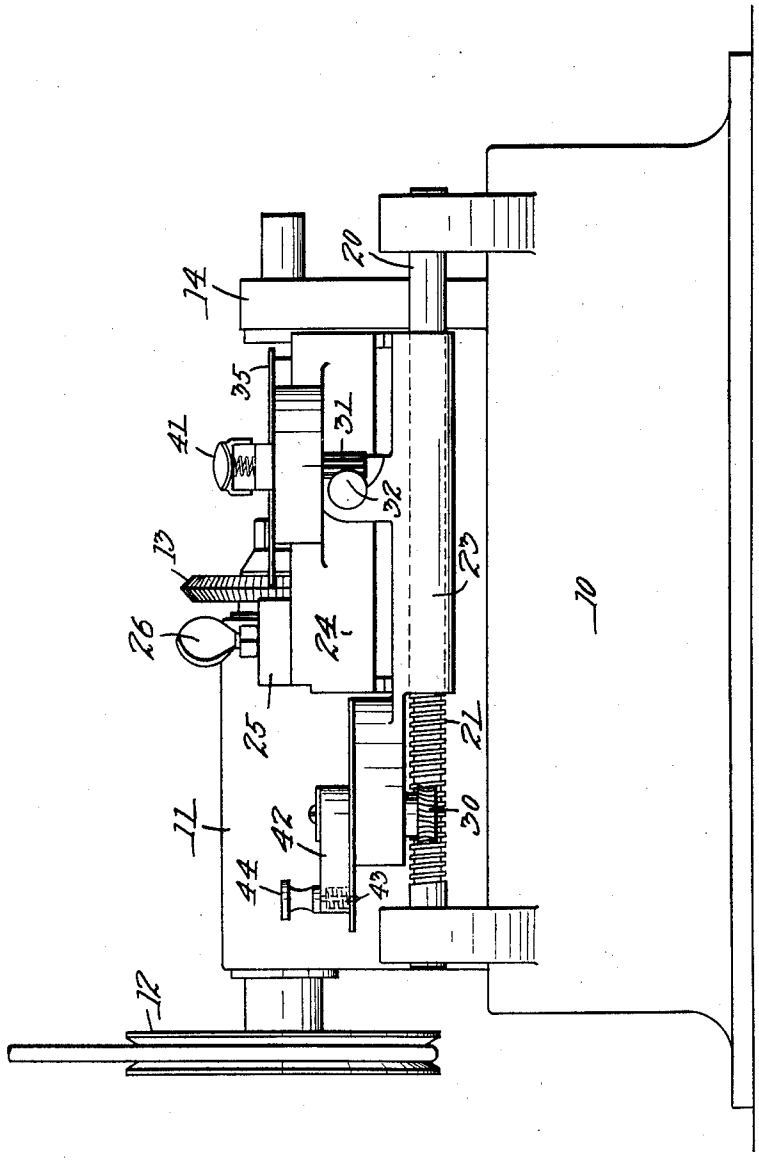


Fig. 2.

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KEY CUTTING MACHINE

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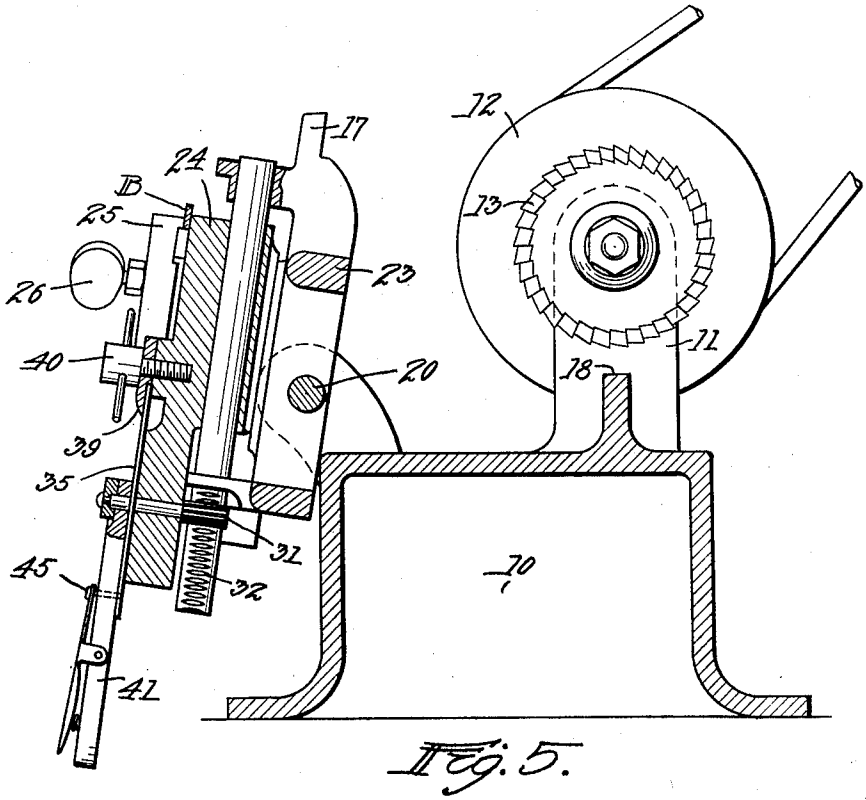


Fig. 5.

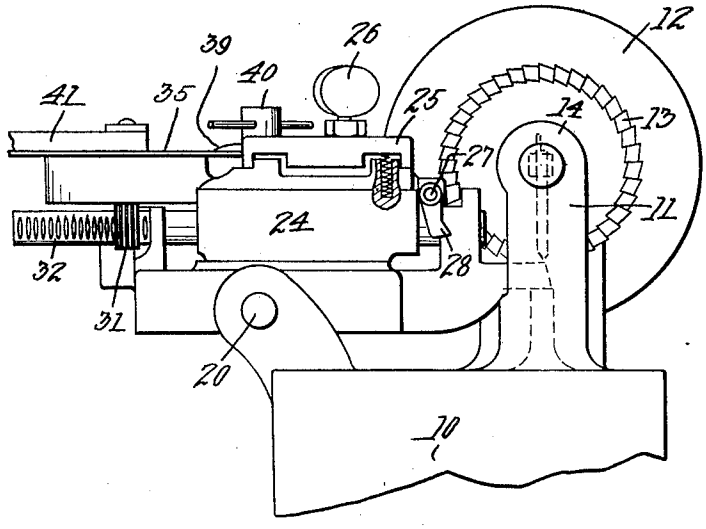


Fig. 4.

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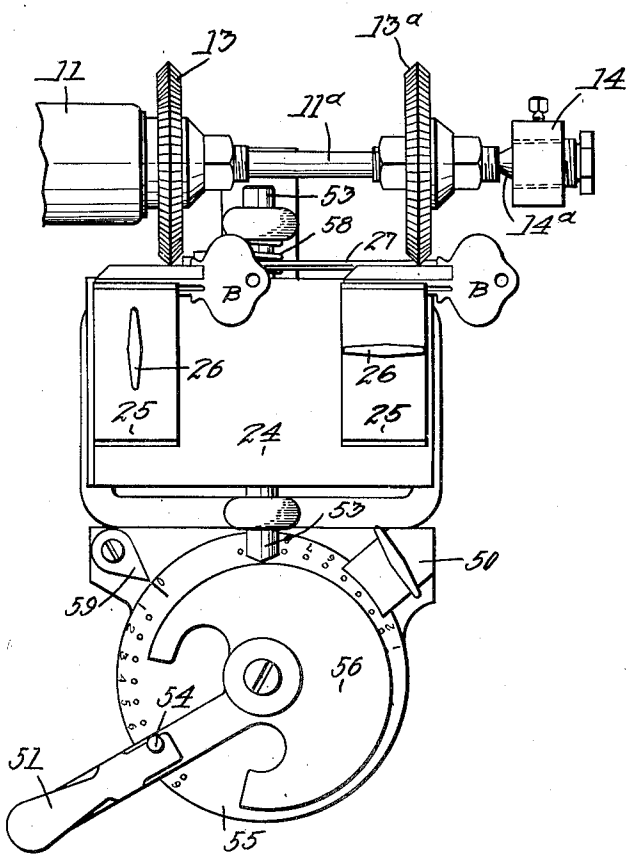


Fig. 6.

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Patented Mar. 11, 1930 1,750,218

UNITED STATES PATENT OFFICE

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KEY-CUTTING MACHINE

Application filed April 18, 1927. Serial No. 184,643.

This invention relates to a machine for cutting keys. The principal objects thereof are to provide means whereby the blank can be duplicated from a master key and on the same machine one or two blanks can be cut at a time without any key to use as a pattern but by code or number; to provide means adapted to be adjusted to any lock manufacturer's code or number for governing the depths of the cuts and the spaces between them without the use of templates, depth keys, or other pattern; to provide this means in the form of detachable and removable discs adapted to be set in stationary position and to cooperate with the means for moving the blanks toward and from the cutter and in a lateral direction with respect thereto so as to get the desired spaces and depths of cut; and to provide a construction in which the whole support for the blank and also the master key, if used, can be turned up on an axis where it can be inspected by the user and then turned down exactly to the right position without interfering with its adjustment.

The invention also involves improvements in other details of construction and combinations of parts as will appear.

Reference is to be had to the accompanying drawings in which

Fig. 1 is a plan of a preferred embodiment of this invention shown as set up to cut a blank by code number without a pattern;

Fig. 2 is a similar view showing the use of the machine for cutting from a master key;

Fig. 3 is a front elevation;

Fig. 4 is an end view;

Fig. 5 is a sectional view on the line 5—5 of Fig. 1, showing the key holding mechanism turned back for setting the blank or key in the proper position; and

Fig. 6 is a plan showing two modifications.

This machine is a universal machine which can be used as stated to cut blanks from master keys or for cutting blanks by code numbers in use by the different manufacturers. It is intended for use, not by the manufacturers especially, although it can be used by them, but for cutting keys in repair shops and especially in shops of lock-smiths and the like.

The machine involves a base 10 as usual on which is a headstock 11 with a spindle operated by a pulley 12, and having a rotary cutter 13 thereon. The tail stock 14 is adapted to receive a center 15 on which is arranged a guide 16. This is used only when cutting a blank B from a key K. The guide 16 is designed to have the same relation to the key that the cutter does to the blank.

The machine is provided with a shaft 20 extending longitudinally thereof and having upon it a screw 21 for adjusting longitudinally a frame 23 which is pivoted on the shaft 20 to swing from horizontal position, shown especially in Fig. 4, to an upright position as shown in Fig. 5.

On this frame is a carriage 24 preferably carrying two clamps 25, although in some cases one of these clamps can be omitted. These clamps or jaws are screwed down by thumb screws 26 to clamp the blank B or the master key K, if that is used, in the same relative positions on the two clamps.

On the front of this carriage 24 is a freely turning shaft 27 having two gauges 28 thereon. It is provided with a knurled end 29 or handle so that it can be turned up as shown in Fig. 2, so that these gauges 28 can be brought up into contact with the key K. The blank and key are shifted in the jaws until they both come into the same relationship with the two gauges 28 as shown in Fig. 2, that is, these gauges are set up against the same element on both. Then the clamps are tightened and these gauges turned down to the position shown in Fig. 4 where they are out of the way. Now whenever the guide 16 is introduced into the notch in the master key K by moving the carriage 24 into proper position therefor, the blank B will move with it and, as the cutter 13 is rotating constantly, this cutter will cut a notch in the blank exactly the same as the notch in the key. The notches will be spaced the same distance from each other and they will have the same depth as those in the master key.

I have already stated that the screw or rack 21 is a part of the shaft 20. This screw is

engaged by a pinion 30 which is mounted on the carriage 24, and by turning it the frame 23 and carriage 24 will move along the shaft 20 in accordance with the rotation of this pinion, so as to bring it to the proper positions to space the notches the right distance apart.

Also mounted on the head 24 is another pinion 31 meshing with a rack 32 which is transverse to the screw 21 and mounted in stationary position on the frame 23. The carriage is slidable along it and the turning of the pinion 31 will move the carriage 24 with the blank and key back and forth in a straight line toward and from the cutter 13 and guide 16 respectively. This insures that the depths of cut on the blank will be the same as those on the master key.

As so far described, the machine is suitable for use where a master key is obtainable. In cases where it is not convenient to get a master key, the number can be obtained from the lock or otherwise, and the same machine can be used. For this purpose, two discs 34 and 35 are used. They are mounted on the shafts of the pinions 30 and 31 respectively. I have shown each disc as being provided with a series of perforations as 36 and 37 which are spaced in accordance with the code of the manufacturer of the key. These codes are used for spacing the notches of the keys and for the depths in cut. Each manufacturer has his own code and of course there is a separate one for the spacing and for the depths. The codes of several manufacturers are indicated on the disc. These two discs, it will be understood, are detachable and adjustable, but in the use of the device are stationary. They are set so that the dial mark 1 on each disc registers with a fixed pointer 38 and 39 respectively. These pointers are held down by thumb screws 40 which are alike, and which will loosen the pointers to remove and replace the disc by others when that is desired or to turn the discs. The discs are both set at the so-called zero point where the mark is shown, and then these discs can be used from then on to arrange for cutting the keys of the manufacturer whose code is indicated thereon by the series of perforations. It will be noted that the perforations are spaced differently by the different manufacturers and on the two discs.

On the shafts of the pinions 30 and 31 are fixed two arms 42 and 41 respectively. On the end of the arm 42 is a spring pin 43 having a head 44 for raising it out of one of the holes in the disc 34, so that this arm can be put in one hole after the other of a certain series. Each time it is changed it will move the carriage 24 along the screw 21 to position the blank in a new place with respect to cutter 13. This, of course, is done when the carriage is drawn back. The arm 41 also has a spring pin 45 operated by a lever 46 extending out over the end of the arm 41. This works in the same way on the disc 35 to move the carriage 24 toward and from the cutter through the pinion 31 to which the arm 41 is fixed.

It will be seen therefore that the carriage can be drawn back from the cutter by the arm 41 and then moved along by the arm 42 and the pin 43 put back in another hole in the disc to positively locate the carriage in that respect. Then the arm 41 can be moved along to the next hole and the pin 45 allowed to slip into it so that the depth of the cut will be positively controlled. These operations are performed ordinarily when the structure comprising the frame 23 and the carriage 24 is swung back to horizontal position, but there is nothing to prevent its being done when located in the vertical position shown in Fig. 5.

In the use of this machine the blank B and the master key K are inserted under the two jaws 25 and one of them clamped in position. Gauges 28 are then turned upwardly so as to engage either the blank or the key in the position indicated in Fig. 2 and the other one is moved along until that is also engaged in that way and then clamped. The gauges are then turned down to the position shown in Fig. 4. It will be understood that while all this is going on the holder is in the position shown in Fig. 5. The user does not have to look over the top of the carriage or in behind the center. Now this holder is turned down so that a projection 17 having a flat finished surface comes down on a rest 18 also finished flat. In this way the frame 23 is positively positioned and held in position by gravity.

Now if a blank is being cut from a master key the two discs 34 and 35 are not used but the arms or handles 41 and 42 are used to move the carriage longitudinally by the action of the pinion 30 along the screw 21 and laterally by the action of the pinion 31 along the rack 32. It will be noticed that the carriage 24 can be moved in either direction on account of the fact that it is the screw 21 which moves it longitudinally and this acts on the frame 23 and the fact that the surfaces 17 and 18 are wide enough to permit all such necessary movement. Furthermore, the head or carriage 24 moves laterally toward and from the cutter on two surfaces 19 which are planed flat.

If the machine is to be used for cutting blanks without any master key, proper discs 34 and 35 are placed on the shafts of the pinions 30 and 31. This is done by removing the arms 41 and 42 by taking out the screws which are shown located in the ends of the two shafts. These discs are then set in the proper position as indicated in Fig. 1 which represents them as placed properly for cutting Sargent keys. The pin 43 is placed in the No. 1 hole on the Sargent scale for

making the first cut and the pin 45 in a hole in the scale on the disc 35 represented by the first numeral of the key member. The blank B is put in the proper position by means of one of the gauges 28 and that is turned down out of the way. The first cut is made with the two pins in the two holes just specified, then the carriage 24 is drawn back by the handle 41 and the pin 43 is pulled up by the knurled head 44 and moved into hole No. 2 in that scale. Then the arm 41 is turned to bring the pin 45 into the proper hole of the other Sargent scale to get the right depth and the proper cut will be made as before described. This is repeated until the proper number of cuts are made.

It will be seen that on the discs 34 and 35 a plurality of scales are shown, in this case, for Sargent and Corbin locks. Of course more scales can be put on the same disc and for their use the discs have to be turned to other zero marks indicated on the discs.

In Fig. 6 two modifications are shown. In the first place the two clamps 25 are used to clamp two blanks B and they are both made at the same time and in exactly the same pattern by use of the cutter 13 and a second cutter 13^a. The latter cutter is mounted on an extension shaft 11^a secured on the main shaft and preferably centered on the rest 14 by a conical center 14^a. The two blanks are spaced in the same way as above described by the gauge 27.

Another way of moving the slide 24 is shown comprising a disc 55, a zero point 59 and a clamp 50, also a cam 56 cooperating with a stud 53 on the slide. An arm 51 is secured to the cam to swing it and located in accordance with the positioning of a pin 54 in a series of holes. Obviously this will move the slide 24 in and out as in the other case. A rod 57 with a spring 58 is used to return the slide and keep the stud 53 always in contact with the cam.

In this way it will be seen that the machine is capable of being used either for cutting from master keys or for cutting one or two keys at a time without any master key, by the use of these scales.

The matter shown in Fig. 6 is not claimed specifically herein as it is presented in my divisional application, Serial No. 229,831, filed October 31, 1927. Although I have illustrated and described only one form of the invention I am aware of the fact that modifications can be made therein by any person skilled in the art 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 key cutting machine, the combination with a rotary cutter, of a shaft, a frame mounted to swing on said shaft parallel to the axis of the rotary cutter from horizontal to substantially vertical position, means for feeding the frame along said shaft, a rack carried by said frame perpendicular to the shaft, a carriage mounted on the frame and slidable on the rack, and means for moving the carriage along the rack toward and from the cutter.

2. In a key cutting machine, the combination with a rotary cutter, of a frame mounted to swing on an axis parallel to the axis of the rotary cutter from horizontal to substantially vertical position, means for moving the frame along said axis, two racks perpendicular to each other, a carriage mounted on the frame and slidable on one rack, two pinions, each meshing with a rack, and handles on the shafts of said pinions for rotating them and moving the carriage longitudinally in one case and laterally in the other.

3. In a key cutting machine, the combination of a carriage movable longitudinally and laterally, means for guiding the carriage to move in the two directions, a rotary cutter located beyond the edge of the carriage, means on the carriage for clamping a key blank in position to be cut by the cutter, the two guiding means each comprising a rack, pinions connected with the carriage and meshing with said racks, arms on said pinions over the carriage for turning them and thereby adjusting the carriage, and means carried by the machine adjacent to said arms for gauging the distance which the arms may be moved for resetting the blank to cut a different notch at a predetermined distance from the next notch and of a predetermined depth.

4. In a key cutting machine, the combination of a carriage movable longitudinally and laterally, a rotary cutter located beyond the edge of the carriage, means on the carriage for clamping a key blank in position to be cut by the cutter, two racks, one arranged longitudinally and the other laterally, pinions connected with the carriage and meshing with said racks, arms on said pinions for turning them and thereby adjusting the carriage, and means carried by the machine adjacent to said arms for gauging the distance which the arms may be moved for resetting the blank.

5. In a key cutting machine, the combination of a carriage having a clamp thereon for holding a blank to be cut, a rotary cutter in position to cut notches in the blank when the carriage is moved into a position therefor, two shafts each having means for moving the carriage in one direction, one longitudinally and the other laterally, a pair of discs centered on said shafts, means for clamping each disc in stationary position, each disc having a series of holes arranged circumferentially conforming to the codes by which the manufacturers make the keys, and pins

movable with said discs adapted to engage in said holes, one after the other, one of the pins and its set of holes to advance the carriage laterally a distance determined by the distance between two adjacent holes, and the other to advance it longitudinally in the same way.

6. In a key cutting machine, the combination with a base having a head stock and tail stock thereon, and a rotary cutter mounted on the head stock to turn constantly, of a shaft carried by said base parallel with the axis of the cutter, a frame pivotally mounted on said shaft and adapted to slide along the same, the base having a raised finished surface and the frame a finished surface adapted to rest thereon when the frame is turned into a position to engage it, said frame also having a top finished surface, a carriage mounted to slide on the last-named finished surface of the base, a rack having a guiding surface fixed to the frame and connected with the carriage by said guiding surface to guide the carriage along the rack which is perpendicular to the axis of the cutter, and means on the carriage and frame for moving the carriage along its rack toward and from the cutter to control the depths of the cuts and the frame along the shaft to space the cuts properly along the key blank.

7. In a key cutting machine, the combination with a base having a head stock and tail stock thereon, and a rotary cutter mounted on the head stock to turn constantly, of a shaft carried by said base parallel with the axis of the cutter, a frame pivotally mounted on said shaft and adapted to slide along the same, a carriage mounted to slide on the frame, a rack fixed to the frame and connected with the carriage to guide the carriage along the rack which is perpendicular to the axis of the cutter, and means on the carriage and frame for moving the carriage along its rack toward and from the cutter to control the depths of the cuts and the frame along the shaft to space the cuts properly along the key blank.

8. In a key cutting machine, the combination with a base having a head stock and tail stock thereon, and a rotary cutter mounted on the head stock to turn constantly, of a shaft carried by said base parallel with the axis of the cutter, a frame adapted to slide along the same, the base having a raised finished surface and the frame a finished surface adapted to rest thereon when the frame is turned into a position to engage it, said frame also having a top finished surface, a carriage mounted to slide on the last-named finished surface of the frame, and means on the frame for moving the frame along the shaft to space the cuts properly along the key blank.

9. In a key cutting machine, the combination with a carriage movable longitudinally and laterally, means for guiding the carriage to move in the two directions, a rotary cutter located beyond the edge of the carriage, means on the carriage for clamping a key blank in position to be cut by the cutter, a pair of discs adapted to be located in stationary position, each disc having a series of holes arranged circumferentially and conforming to the codes by which the manufacturers make their keys, two arms, one centered on each disc and each having a pin adapted to enter the holes of said series in the respective discs, means movable by one of said arms for moving the carriage laterally toward the cutter and means movable by the other arm for moving the carriage longitudinally along the cutter, whereby the location of the pins in the holes will determine the position of each cut and its depth.

10. In a key cutting machine, the combination with a carriage, means for guiding the carriage to move longitudinally and laterally, a rotary cutter located beyond the edge of the carriage, means on the carriage for clamping a key blank in position to be cut by the cutter, a pair of discs having scales conforming to the codes by which the manufacturers make their keys, an arm centered on each disc and each having means for locating them in accordance with the respective scales, means movable by one of said arms for moving the carriage laterally toward the cutter and means movable by the other arm for moving the carriage longitudinally along the cutter, whereby the locating means will determine the position of the cut and its depth.

11. In a key cutting machine, the combination with a rotary cutter, of means for clamping a blank, means for clamping a master key, a carriage on which both of said clamping means are carried, means for gauging the blank and key at a proper distance from each other so that the blank can be cut from the master key, and means for locating the carriage by a manufacturing code in proper position with relation to the cutter, for cutting the blank by said cutter.

In testimony whereof I have hereunto affixed my signature.

MORRIS FALK.