Dec. 20, 1955

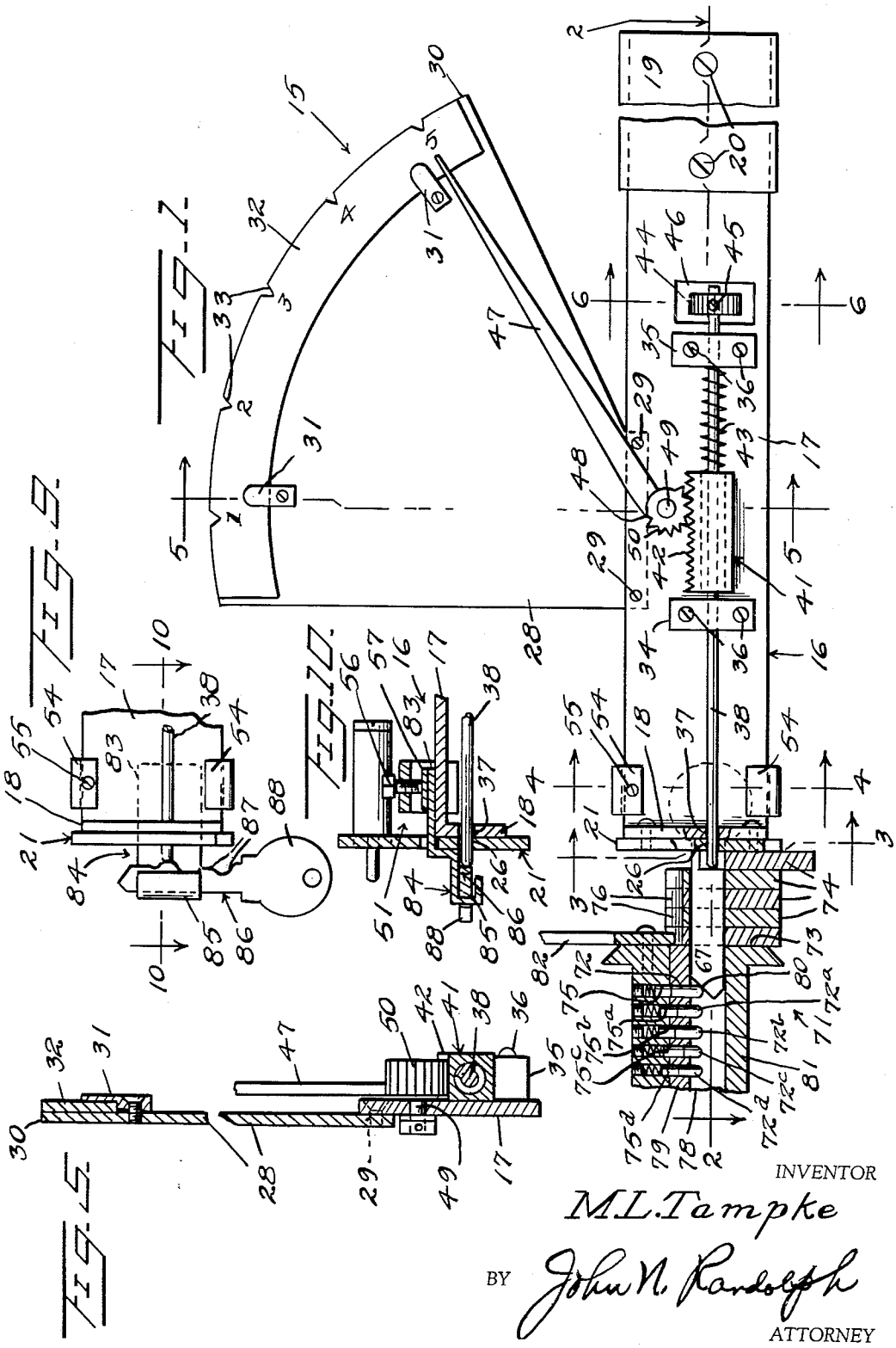
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2,727,312

UNIVERSAL COMBINATION PIN AND DISC TUMBLER LOCK AND KEY DECODER

Filed March 4, 1955

2 Sheets-Sheet 1



INVENTOR

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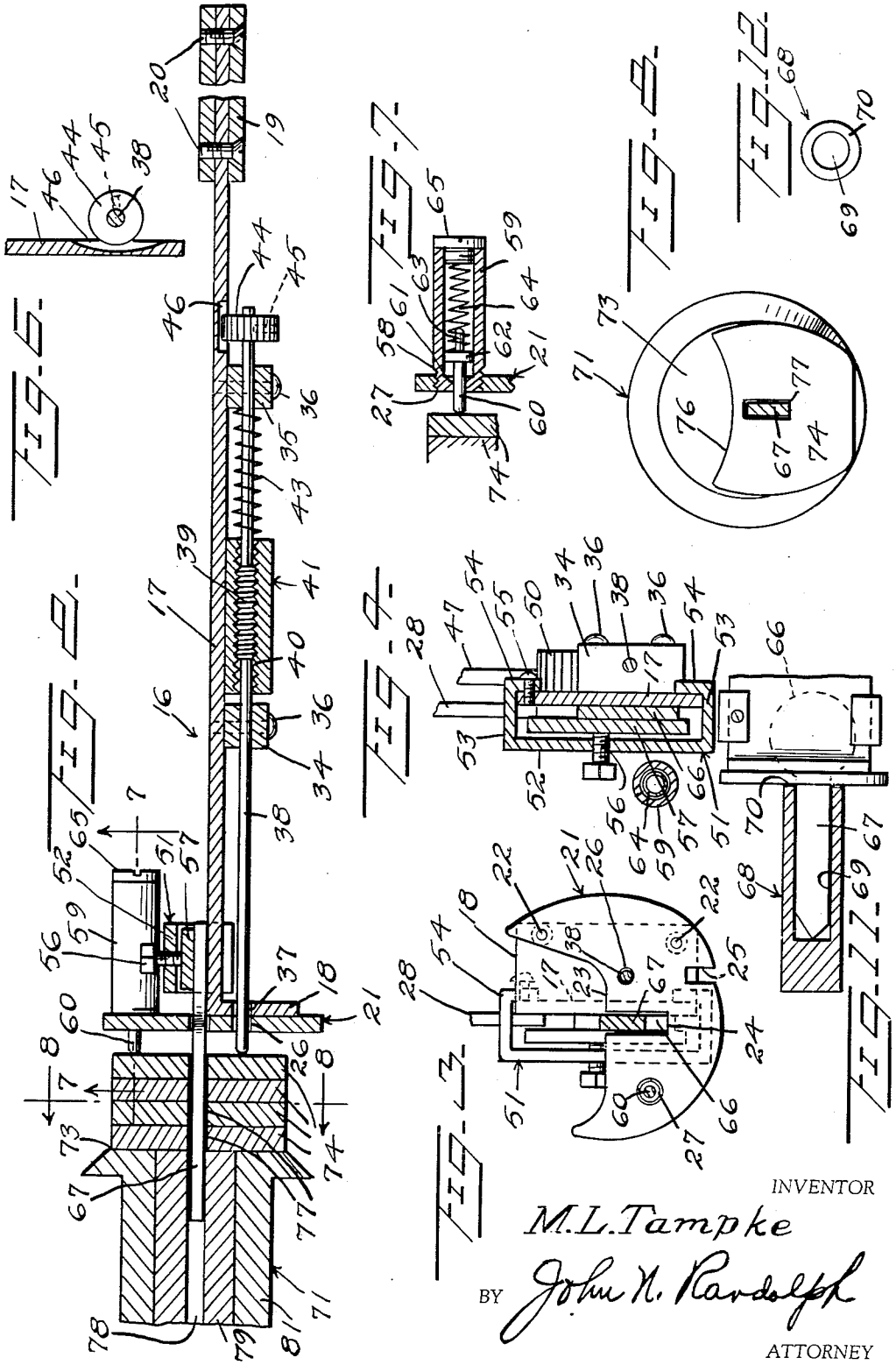
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UNIVERSAL COMBINATION PIN AND DISC TUMBLER LOCK AND KEY DECODER

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UNIVERSAL COMBINATION PIN AND DISC TUMBLER LOCK AND KEY DECODER

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9 Claims. (Cl. 33—174)

This invention relates to a decoder adapted for use in decoding substantially any type of pin and disc (wafer) tumbler lock and key by interchangeably employing certain parts of the decoder for readily adapting it to different locks having different numbers of tumblers and wherein the tumblers are spaced different distances apart.

Another object of the invention is to provide a decoder for decoding locks and keys having any number of depth cuts.

A further object of the invention is to provide a lock decoder having unique means for quickly and easily adjusting the indicating mechanism to adapt the decoder to locks having different spacings between the tumblers and pins.

A further object of the invention is to provide a decoder having an extremely simple means for accurately determining the locations of the tumbler stations.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is a side elevational view, partly in section and partly broken away showing the lock decoder in an initial operative position;

Figure 2 is a longitudinal sectional view thereof, taken substantially along a plane as indicated by the line 2—2 of Figure 1 and on an enlarged scale;

Figures 3 and 4 are cross sectional views of the lock decoder, on enlarged scales, taken substantially along planes as indicated by the lines 3—3 and 4—4, respectively, of Figure 1;

Figure 5 is an enlarged fragmentary cross sectional view, taken substantially along a plane as indicated by the line 5—5 of Figure 1;

Figure 6 is an enlarged detailed cross sectional view, taken substantially along a plane as indicated by the line 6—6 of Figure 1;

Figure 7 is a fragmentary longitudinal sectional view, taken substantially along a plane as indicated by the line 7—7 of Figure 2;

Figure 8 is a transverse sectional view, taken substantially along a plane as indicated by the line 8—8 of Figure 2;

Figure 9 is a fragmentary side elevational view of a portion of the gauge with an attachment thereof applied for use in decoding a key;

Figure 10 is a sectional view, taken substantially along a plane as indicated by the line 10—10 of Figure 9;

Figure 11 is a fragmentary side elevational view, partly in section, of a portion of the decoder and illustrating the use of a gauge part thereof, and

Figure 12 is an end view looking toward the inner end of the gauge of Figure 11.

Referring more specifically to the drawings, the novel combination lock and key decoder in its entirety and comprising the invention is designated generally 15 and includes a frame, designated generally 16 comprising an elongated bar 17 having a laterally turned end 18, constituting the forward end of the frame 16 and forming a supporting element which is disposed crosswise of the longitudinal axis of said frame. Plate members 19 are secured to both sides of the other end of the bar 17 by fastenings 20 to form a handle.

As clearly illustrated in Figures 2 and 3, the frame part 18 extends transversely in one direction only from the plane of the bar 17 and provides a support for a face plate 21 which is secured to the outer side of the frame part 18 by screw fastenings 22. As seen in Figure 3, the face plate is relatively wide and extends laterally from the bar 17 in a direction away from the frame part 18 and is provided with a recessed upper edge 23. The face plate 21 has a relatively deep notch 24 opening outwardly of the recessed upper edge 23 and is also provided with a downwardly opening notch 25. The face plate 21 has openings 26 and 27 which are disposed on opposite sides of the notch 24.

A dial supporting plate 28 is secured by fastenings 29 to an outer side of the bar 17, opposite the side thereof from which the part 18 extends. The dial plate 28 extends upwardly from the bar 17 and has an arcuate upper or outer edge 30. A plurality, preferably two, spring clips 31 are suitably secured at corresponding ends thereof to the inner side of the plate 28 and have free ends extending toward said outer edge 30. The spring clips 31 detachably mount a gauge strip 32 against the outer portion of the inner side of the plate 28 by clamping portions of the strip 32 between the plate and the free ends of said clips 31. The gauge strip 32 is provided with spaced notches 33 in the arcuate outer edge thereof which are numbered consecutively in a direction toward the end of the strip 32 which is located nearest the handle 19. The arcuate outer edge of the strip 32 is supported by the clips 31 substantially concentric to the outer edge 30 of the dial plate 28.

A pair of journal blocks 34 and 35 are secured to the inner side of the bar 17 by fastenings 36. The journal blocks 34 and 35 are disposed in spaced apart relation to one another and align with one another and with the face plate opening 26 and with an opening 37 of the frame part 18. A feeler rod 38 extends slidably and turnably through the openings 26 and 27 and through the journal blocks 34 and 35 and is supported in spaced apart relation to the bar 17, as best illustrated in Figure 2. The feeler rod 38 is provided with an enlarged threaded portion 39 which engages a threaded bore 40 which extends longitudinally through a rack 41. The rack 41 is supported by the feeler rod 38 for movement longitudinally of the frame 16 between the journal blocks 34 and 35. The rack 41 is prevented from turning with the rod 38 by slidable engagement of one face thereof with the bar 17, as best seen in Figures 2 and 5. The rack 41 is provided with a toothed upper surface 42, as seen in Figure 1. A spiral expansion spring 43 is mounted on the rod 38 between the rearmost journal block 35 and the rack 41 for urging said rack and the feeler rod 38 forwardly of the frame 16. A thumb knob 44 is secured by a setscrew 45 to the rear end of the rod 38, between the journal block 35 and handle 19. The inner side of the bar 17 is provided with a recess 46 to loosely accommodate a portion of the knob 44. It will be readily apparent that the rod 38 can be turned by the knob 44 for longitudinally adjusting the rod relative to the rack 41.

A tapered pointer 47 has an enlarged end 48 which is journaled on a pivot pin 49. The pivot pin 49 extends through the bar 17 and supports the head 48 on the inner side thereof and above the rack 41. The part 48 is provided on a portion of its periphery with teeth 50 which are disposed concentrically with respect to the pivot 49. Said teeth 50 mesh with the teeth 42 of the rack

41 as best seen in Figure 1, and the tapered outer end of the pointer 47 is swingably disposed over the gauge strip 32.

A pressure plate supporting bracket 51, as best seen in Figure 4, has an intermediate portion 52 which is spaced outwardly from the bar 17. The bracket 51 has legs 53 which extend inwardly from the ends thereof across the top and bottom edges of the bar 17. The legs 53 terminate in inturned terminal portions 54 which engage parts of the inner side of the bar 17 and at least one of which is secured thereto by a screw fastening 55 for mounting the bracket 51 on the frame 16 and adjacent the forward end thereof. A clamping screw 56 extends threadedly through the intermediate portion of the bracket part 52 and is adapted to bear against a pressure plate 57, which is disposed between the bracket part 52 and a part of the bar 17, for a purpose which will hereinafter be described.

As best seen in Figure 7, the opening 27 of the face plate 21 is relatively large and threaded to receive the externally threaded end 58 of a guide sleeve 59 which is supported by and extends rearwardly from the plate 21. A pin 60 extends slidably through a restricted opening 61 in the forward end of the sleeve 59. The pin 60 has a head 62 which is loosely disposed in the sleeve 59 and which is provided with a stem 63 which projects toward the rear end of the sleeve 59. A spiral expansion spring 64 is disposed in the sleeve 59 and has one end disposed around the stem 63 and bearing against the head 62 and an opposite end seating against a plug 65 which is threadedly mounted in the rear end of the sleeve 59. Thus, the spring 64 urges the pin 60 outwardly through the sleeve opening 61.

The head 66 of a key blank 67 fits between the outer side of the forward portion of the bar 17 and the pressure plate 57 and is loosely clamped therebetween initially by tightening the screw 56 with the fingers. The key blank extends outwardly through the notch 24 of the face plate 21. A gauge 68 is then positioned over the key blank 67. Said gauge has a bore or recess 69 opening outwardly of one end thereof to receive the key blank 67 which abuts against the inner end of said bore or recess. The gauge 68 is then moved until the end face 70 thereof, from which the recess 69 opens, is in abutting engagement with the face plate 21. The screw 56 is then tightened with a tool to securely clamp the head 66 between the plate 57 and bar 17 to hold the key blank 67 correctly positioned relative to the face plate 21.

A portion of a conventional pin type lock is illustrated in Figures 1 and 2 and is designated generally 71. Locks of this type vary as to the spacing between the tumbler pins thereof and also as to the spacing between the forwardmost pin 72 and the face 73 of the lock. Gauges 68 are provided for use with different locks wherein the spacing between the face 73 and pin 72 varies. The aforedescribed adjustment of the key blank 67 by the gauge 68 insures a proper orientation of the key blank relative to the frame 16 for a particular lock 71. Also, key blanks 67 of different sizes are provided for use in decoding different locks. In addition, a set of spacer plates or discs 74 are provided with the decoder 15 for each type of lock 71. The spacer discs 74 of each set correspond in thickness to the spacing between adjacent tumblers of the lock.

The lock 71 as shown is provided with five tumbler pins 72, 72*a*, 72*b*, 72*c* and 72*d* which are slidably disposed in complementary bore portions of the plug 79 and cylinder 81 of the lock 71, designated 75, 75*a*, 75*b*, 75*c* and 75*d*, respectively. The spacer discs 74 have recessed upper edges 76, as best seen in Figure 8, and are provided with slots 77 through which the key blank 67 extends. Since the lock 71 is provided with five tumbler pins, four spacer discs are mounted thereon. The protruding end of the key blank 67 is then inserted into the slot 78 of the plug 79 of the lock. A fifth spacer

disc 74 is inserted between the face plate 21 and the disc 74 carried by the key blank and which is located adjacent said plate 21, the fifth disc 74 being inserted upwardly and not engaging over the key blank, as seen in Figure 1. The five discs 74 are then tightly pressed between the face plate 21 and the face 73 of the lock and when thus disposed, the inclined forward end portion 80 of the key blank 67 should be disposed adjacent the tumbler pin 72. Assuming that a dial strip 32, having properly spaced notches 33 and graduations for the lock 71, has been applied to the dial plate 28, it will be readily apparent that with the parts thus disposed the forward end of the feeler rod 38 will engage against the spacer disc 74 which is mounted on the key blank 67 and is nearest the face plate 21, said feeler rod passing over the upper edge 76 of the fifth spacer disc 74, which is being utilized as a gauge, as seen in Figure 1. The knob 44 is then manually turned for adjusting the rack longitudinally on the feeler rod 38 and until the pointer 47 is disposed in alignment with the highest numbered rearmost notch 33, which as here shown is identified by the numeral "5." Said fifth spacer disc 74 is then removed, having completed its function as a setting gauge.

The decoder 15 is then ready to be used for decoding the lock 71. With the forward end of the key blank 67 in the slot 78 and with the outermost or left-hand spacer disc 74 engaging against the face 73 of the lock and the innermost or right-hand spacer disc 74 abutting the tip of the feeler rod 38, the frame 16 is twisted slightly by the hand grasping the handle 19, either to the right or to the left. At the same time, the decoder 15 is pushed toward the lock 71. This will cause the feeler rod 38 to be displaced rearwardly or from left to right of Figure 1. As the rack 41 will move with the rod 38, the pointer 47 will be swung counterclockwise as seen in Figure 1 relative to the dial strip 32. When this occurs, the forwardmost pin 72 by engagement with the edge 80 of the key blank will be displaced radially outward of the bore portion 75 of the plug 79. When the tumbler 72 has thus been moved to what is known as the "splitting position," said tumbler 72 will have a tendency to strike the edge of the wall of the cylinder 81 of the lock, since the bore portion 75 of the cylinder will be slightly out of line with the bore portion 75 of the plug 79. This will check inward movement of the key blank 67 into the slot 78. When this occurs, the position of the pointer 47 is read relative to the numbered notch 33 nearest which it is disposed. This reading constitutes the number of the depth cut that is required in the key for the edge portion which will engage the pin 72, when the key is fully inserted for opening the lock.

The key blank 67 is then removed from the lock 71 and the outermost or left-hand spacer disc or plate 74 is then removed from the key blank, after which the operation previously described is repeated for decoding the tumbler pin 72*a*. The tumbler pin 72*b* is thereafter decoded after removal of another spacer disc 74. Thereafter the tumbler pin 72*c* is decoded in a like manner after removing another spacer disc 74 and with the last remaining spacer disc. The last spacer disc 74 is then removed from the key blank 67 and the tumbler 72*d* is decoded by the left-hand forward end of the feeler rod 38 engaging the lock face 73. It will be understood that the depth cut readings for the key is noted for each tumbler decoded by the position of the pointer 47 relative to the notches 33 of the gauge strip 32, as previously described in reference to the tumbler 72. With the information thus obtained it will be readily apparent that a key can be easily cut in a conventional manner to fit the lock 71.

As previously mentioned, a chart will be provided with the decoder 15 for indicating the proper thickness of spacer discs or plates 74, the proper size of key blank 67, the proper gauge 68 and gauge strip 32, to be employed with each type of pin or disc type tumbler lock to be decoded. It will also be apparent that locks having more

than five tumblers may readily be decoded with the decoder **15** by employing longer key blanks and a greater number of spacer plates **74** of a proper thickness.

The spring projected plunger pin **60** functions in the decoding of the lock as best illustrated in Figure 2 by engaging the spacer disc **74** or the lock face **73**, which is engaged by the forward end of the feeler rod **38**, on the opposite side with respect to the key blank **67**, to insure maintenance of the frame bar **17** in a position parallel to the plug slot **78** and so that the spacer plates **74** will not be canted relative to the lock face **73**.

It will be readily apparent that the decoder **15** may function in the same manner for decoding a disc or wafer type tumbler lock.

The spacer discs **74** and the face plate **21** have recessed upper edges to accommodate keyhole covers which are mouted on the faces **73** of many locks, as illustrated in Figure 1, wherein the cover **82** is shown in an open position above the recessed upper edges **76** of the spacer discs **74**.

As illustrated in Figures 9 and 10, the decoder **15** can also be utilized for decoding keys. When so employed, the shank end **83** of a key retaining member **84** is inserted through the notch **24**, in lieu of the key blank **67**, and is clamped between the bar **17** and the pressure plate **57** by tightening the clamping screw **56**. The key retainer **84** is provided with an inwardly opening channel portion **85** which is disposed in alignment with the openings **26** and **37**, when the key retainer is clamped as illustrated in Figure 10. After applying the proper gauge strip **32**, for the key to be decoded, to the plate **28** as previously described, a blank key of the same type as the key to be decoded is positioned in the channel **85** and the forward end of the feeler rod **38** is permitted to move from right to left under the action of its spring **43** until its left-hand end abuts against an edge of the key blank. The knob **44** is then turned to effect adjustment of the rack **41** on the rod **38** for swinging the pointer **47** until it is in alignment with the notch **33** of the strip **32** bearing the designation "1." The blank key is then removed from the channel **85** and is replaced by a key **86** to be decoded. The cuts **87** of the key **86** are then progressively moved into position to be engaged by the tip of the feeler rod **38** and a reading of each cut by the location of the pointer **47** relatively to a notch of the strip **32** is then recorded for indicating the depth of the cuts **87** of the key from end-to-end thereof. The notch **25** of the plate **21** is provided to accommodate a portion of the key head **88** when the cuts **87** located adjacent the key head **88** are being decoded. As in decoding locks, a proper scale **32** must be employed for the particular type of key being decoded.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the function or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A decoder of the character described comprising an elongated frame having a forward end and a rear end, a face plate mounted on said forward end and disposed transversely of the axis of the frame, a feeler rod having a forward end extending loosely through said face plate, means supported by the frame for slidably supporting said feeler rod for movement longitudinally thereof, a gauge member, means mounting said gauge member imovably on said frame, a pointer, means pivotally mounting one end of said pointer on the frame for swinging movement of the other free end of the pointer across said gauge member, said first mentioned pointer end having a gear segment disposed concentrically around the pointer pivot, a rack supported on said feeler rod having teeth meshing with said gear segment, spring means urging the feeler rod and rack to move in one direction relatively to the frame for displacing the forward end of the feeler rod outwardly from the face plate, clamping means carried by said frame

adjacent the face plate, and means detachably and adjustably clamped to said frame by said clamping means and projecting outwardly from the face plate, said last mentioned means being adapted to engage a part to be decoded, and said feeler rod engaging a portion of the part to be decoded and being held thereby in a predetermined position relative to the face plate for selectively positioning the pointer relative to a portion of the gauge member for indicating the code of said part engaged by the feeler rod.

2. A decoder as in claim 1, said last mentioned means comprising a key retainer having an end portion secured to the frame by said clamping means and an opposite end portion defining an inwardly opening channel disposed beyond and opening toward said face plate and adapted to receive therein the part to be decoded, and the forward end of said feeler rod projecting from the face plate toward said channel and being adapted to bear against said part whereby the depth cut thereof will be indicated by the location of the free end of the pointer relative to the gauge member.

3. A decoder as in claim 1, said last mentioned means comprising a key blank.

4. A lock decoder of the character described comprising a frame having a forward end and a rear end, a face plate mounted on said forward end and disposed transversely of the axis of the frame, a feeler rod having a forward end extending loosely through said face plate, means supported by the frame for slidably supporting said feeler rod for movement longitudinally thereof, a gauge member, means mounting said gauge member immovably on said frame, a pointer, means pivotally mounting one end of said pointer on the frame for swinging movement of the other free end of the pointer across said gauge member, said first mentioned pointer end having a gear segment disposed concentrically around the pointer pivot, a rack supported on said feeler rod having teeth meshing with said gear segment, spring means urging the feeler rod and rack to move in one direction relatively to the frame for displacing the forward end of the feeler rod outwardly from the face plate, clamping means carried by said frame adjacent the face plate, a key blank having a head secured to the frame and longitudinally thereof by said clamping means, said key blank extending outwardly from the face plate and being adapted to extend into a key receiving slot of a pin or disc type tumbler lock, and a plurality of spacing discs mounted on the key blank between the face of the lock and the forward end of the feeler rod for displacing the feeler rod longitudinally of the frame when the key blank is moved into engagement with a tumbler of the lock to actuate the pointer through the rack and gear segment for moving the free end of the pointer to a position relative to the gauge member for indicating the code of the tumbler engaged by the key blank.

5. A lock decoder as in claim 4, said gauge member mounting means comprising a plate secured to and extending upwardly from the frame and provided with spaced retaining clips, said gauge member comprising an elongated arcuate strip detachably supported against a side of said plate by the clips and beneath the free end of said pointer, said strip having a series of longitudinally spaced numbered notches for indicating the codes of lock tumblers.

6. A lock decoder as in claim 4, said feeler rod supporting means comprising a pair of journal members secured to the frame in spaced apart relation to one another in which portions of said feeler rod are slidably and rotatably disposed, said feeler rod having an enlarged threaded portion extending through and threadedly engaging in said rack, a thumb knob mounted on the rear end of said feeler rod and adapted to be manually actuated for turning the rod to move said rack relative to the rod for adjustably setting the pointer relative to said gauge member when the forward end of said feeler rod is disposed a predetermined distance beyond the face plate.

7. A lock decoder as in claim 4, a plunger element extending forwardly from said face plate, means supported by said face plate and slidably supporting and guiding said plunger element, and spring means urging said plunger element outwardly of the face plate, said plunger element and the forward end of said feeler rod straddling the key blank and cooperating with one another by engagement with the spacer disc disposed adjacent the face plate for maintaining the key blank in alignment with the key receiving slot of the lock.

8. A lock decoder as in claim 4, said spacer discs and the face plate having recessed top portions adapted to accommodate a keyhole cover of the lock when the cover is in an open position.

9. A lock decoder as in claim 4, and a handle secured to and mounted on the opposite rear end of said frame and by means of which the lock decoder is adapted to be manually supported while in use.

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