

May 2, 1950

H. M. OLSON
ENGRAVING MACHINE

2,506,166

Filed June 24, 1946

5 Sheets-Sheet 1

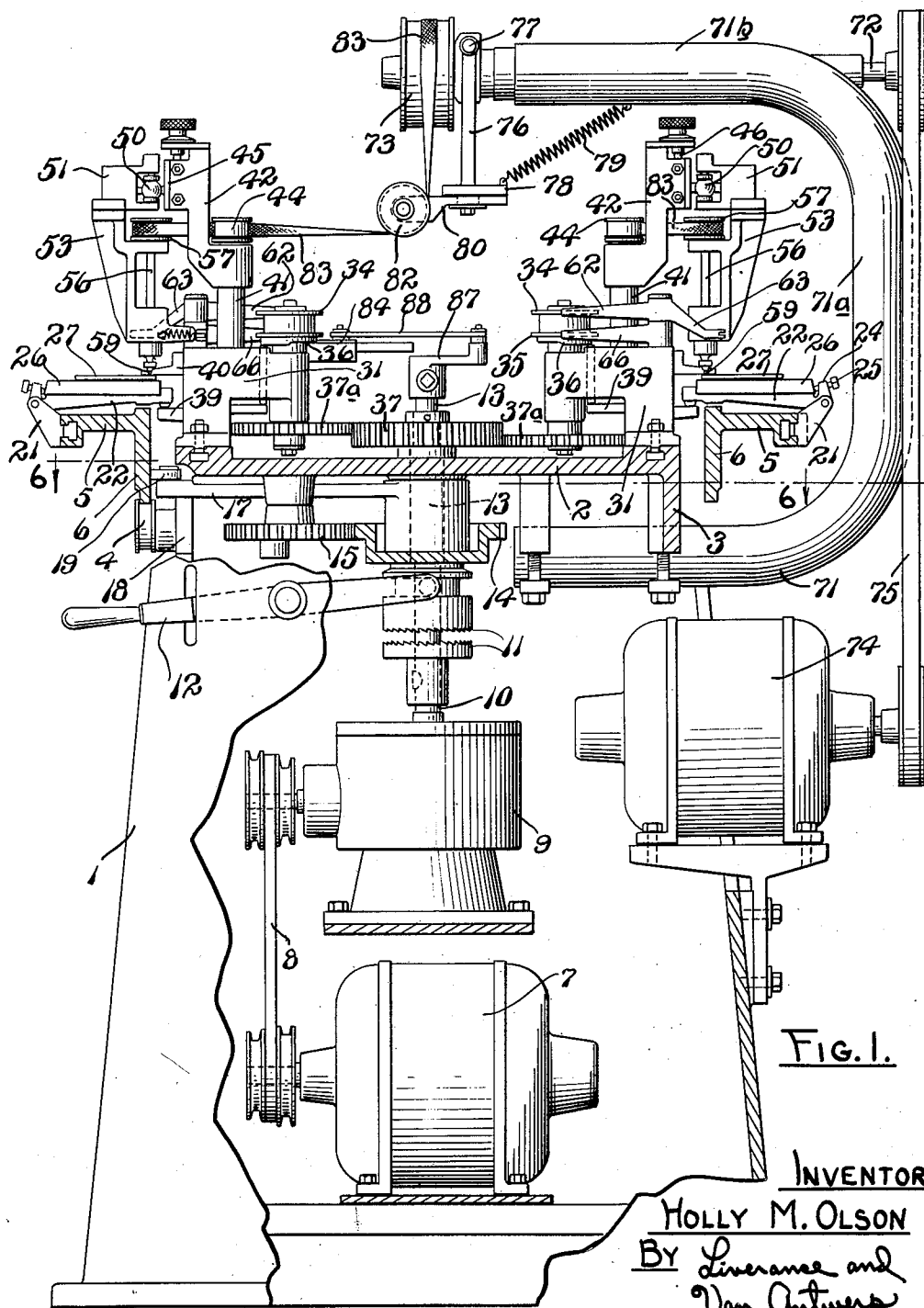


FIG. 1.

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5 Sheets-Sheet 2

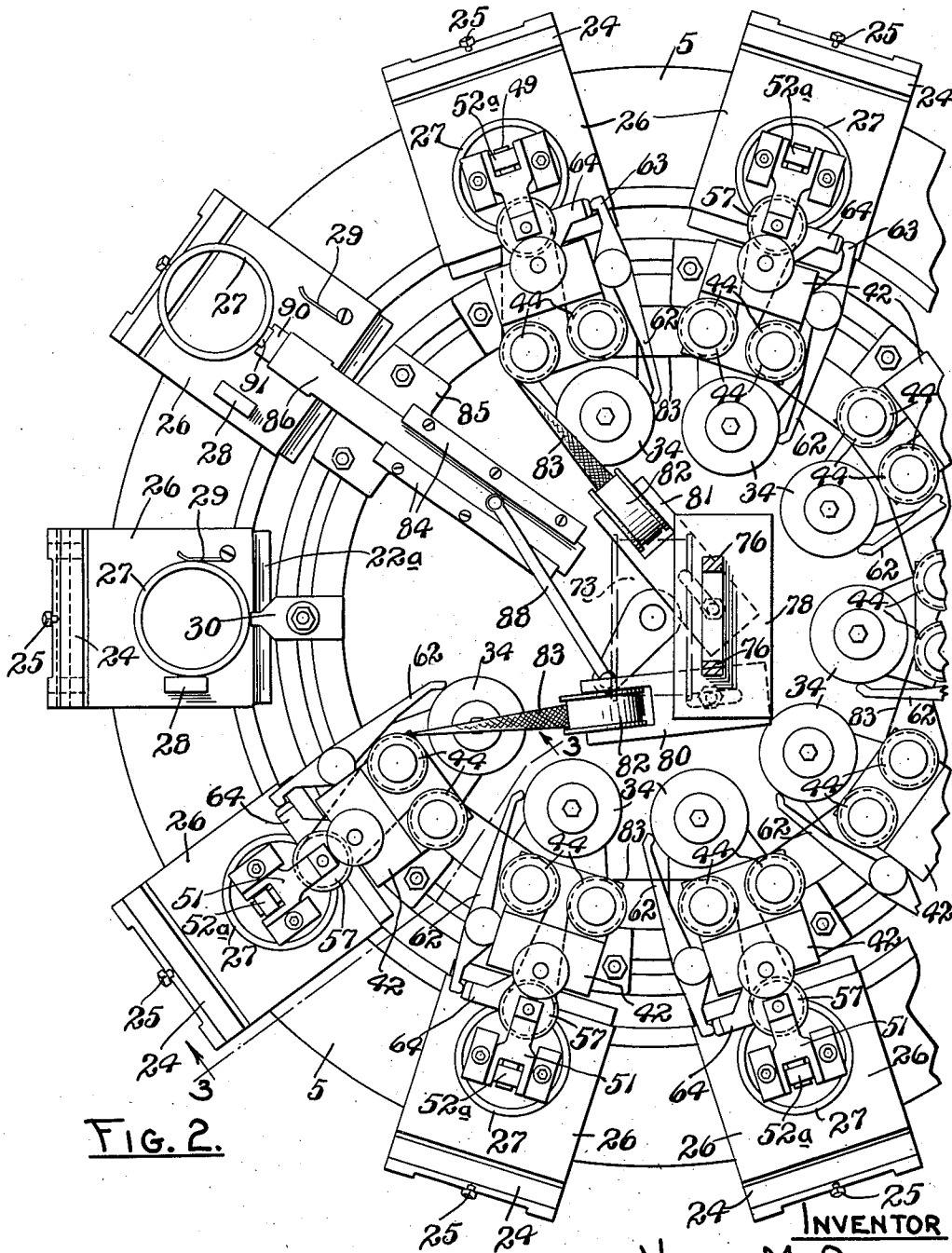


FIG. 2.

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5 Sheets-Sheet 3

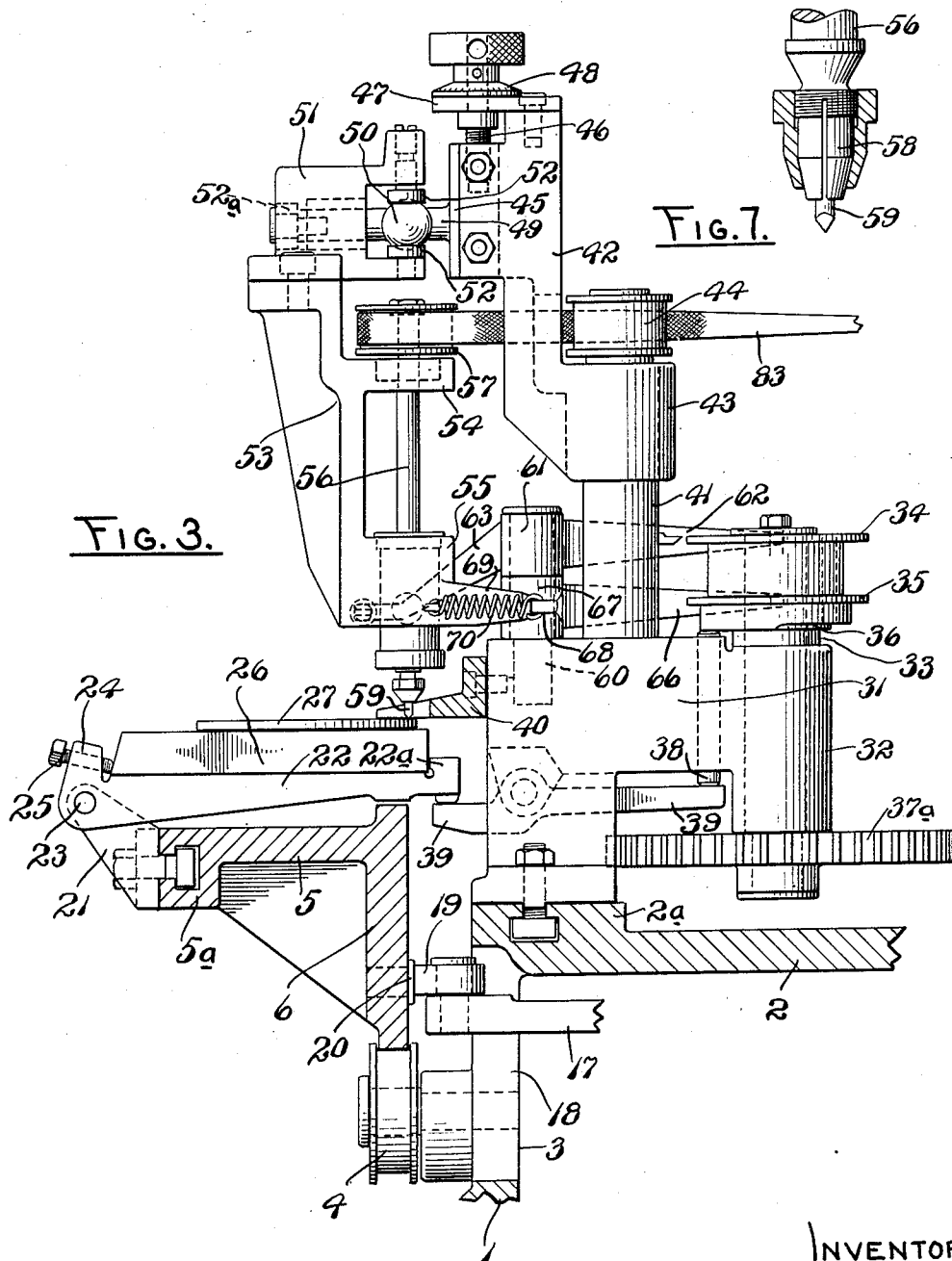


FIG. 3.

FIG. 7.

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5 Sheets-Sheet 4

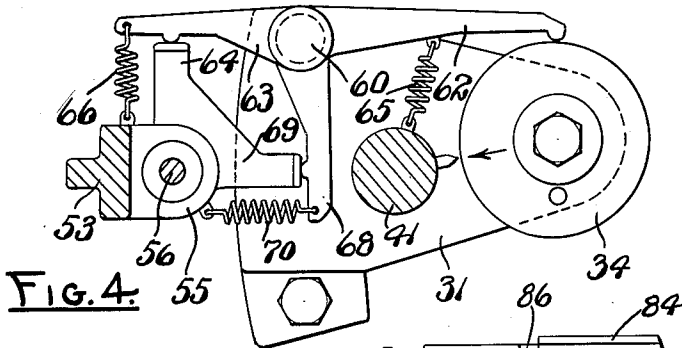


FIG. 4.

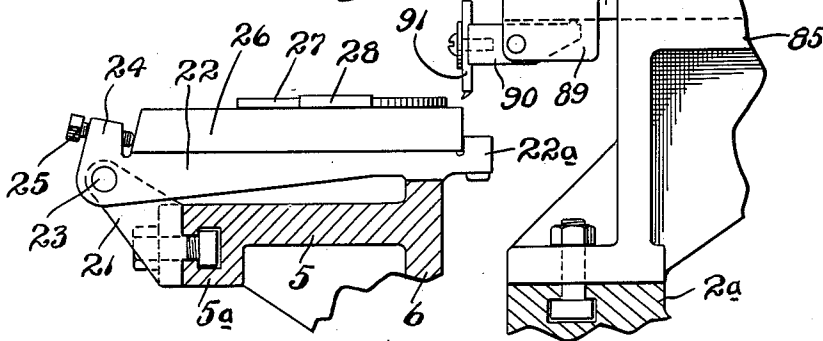


FIG. 5.

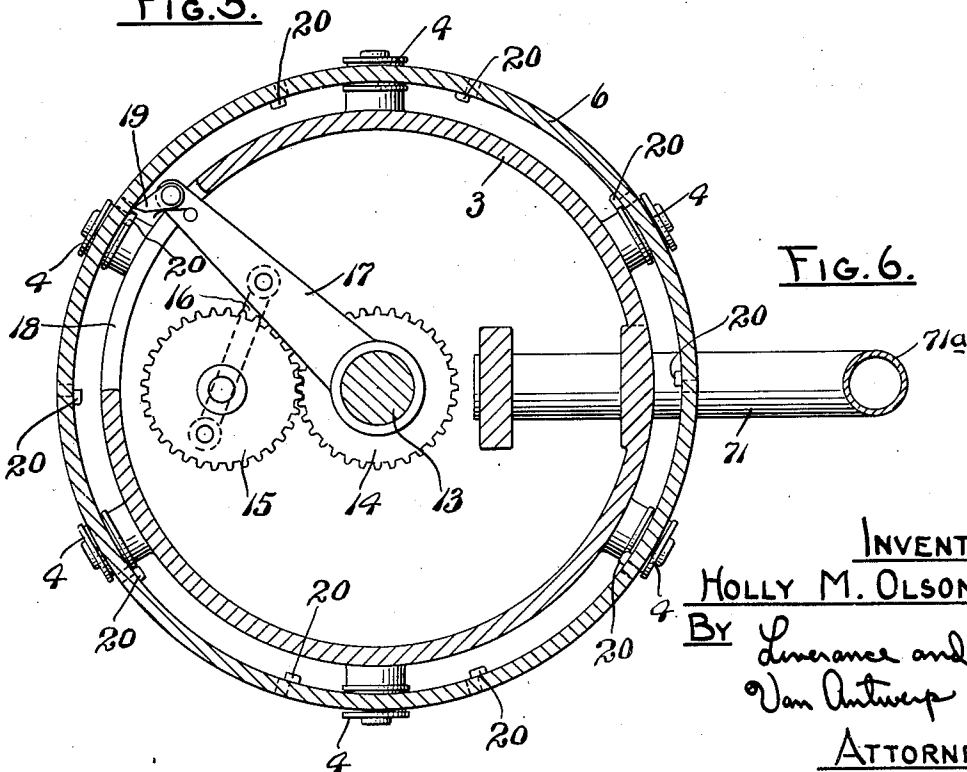


FIG. 6.

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5 Sheets-Sheet 5

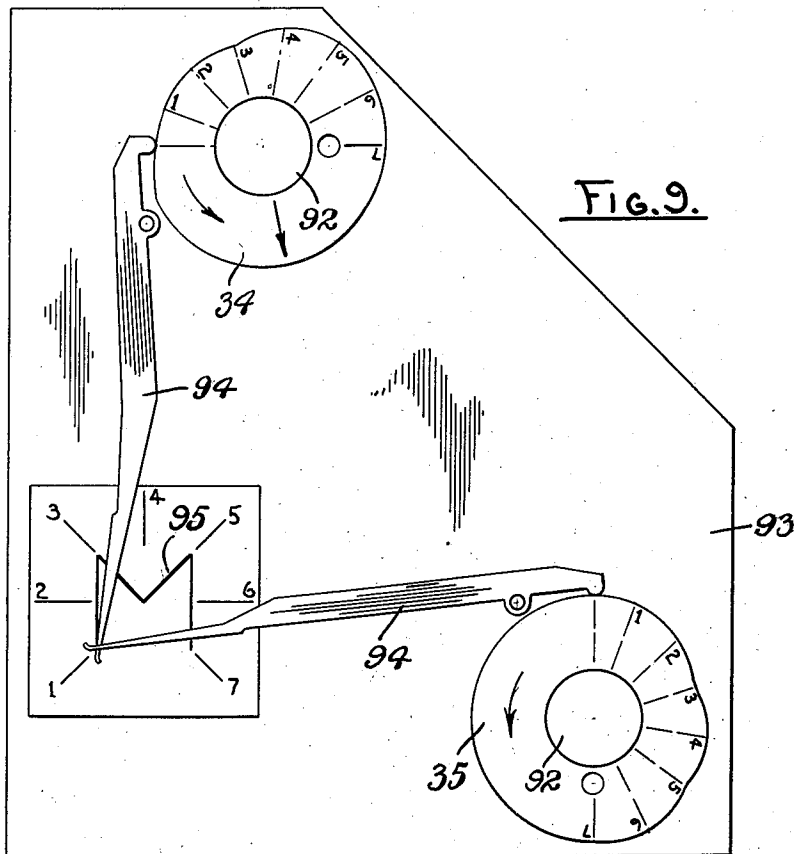


FIG. 9.

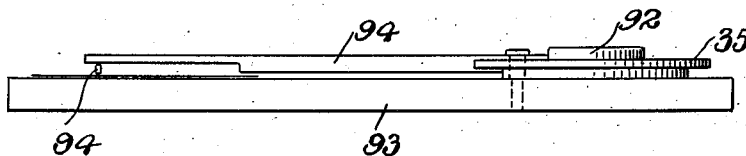


FIG. 10.

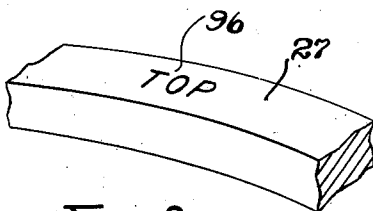


FIG. 8.

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2,506,166

ENGRAVING MACHINE

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Application June 24, 1946, Serial No. 678,869

7 Claims. (Cl. 90—13.1)

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The present invention relates to an engraving machine. It is disclosed in this application for the purpose of engraving letters to make words at one side of piston rings, for the guidance of the installer of said rings in piston ring grooves of pistons with which they are to be used. The invention, however, is not limited to engraving piston rings but is of a wider application and may be utilized in conjunction with the engraving of letters or characters at a surface of metal parts or articles, with a proper utilization of special fixtures for holding and carrying different articles. In the present machine the structure illustrated is for the ready entrance, holding and removal of piston rings for engraving in the manner stated, but other fixtures for holding other articles which are to have letters or characters engraved thereon may be substituted for the piston ring carrying fixtures without departing from the invention.

With the present invention, a plurality of engraving units, simultaneously driven, and each carrying a rotatable engraving tool are mounted above and around a circular table, said engraving units being located on consecutive spaced relation to each other around the table at equal distances from each other, except between, what may be termed, the first and the last of the series of engraving units, there is a vacant section filled by two stations, one where the articles to be engraved are inserted into the machine immediately prior to being moved to the first engraving unit, and another where the engraved articles are to be ejected from the machine after they have passed the last engraving unit. During the course of movement of articles to be engraved from the entrance or loading to the ejecting stations, they pass underneath the successive engraving tools, one for each of the characters to be engraved, are stopped and held against movement while the engraving tool of a particular unit performs its office of cutting one letter or character, and succeeding letters or characters are engraved at subsequent stoppages at succeeding engraving units of the machine. And, where the number of engraving units is greater than the number of letters or characters which are to be cut, only a sufficient number of the units will be supplied with the engraving cutting tools for cutting only the numbers of letters or characters wanted, the stopping and passing at others of the units being productive of no engraving work upon the articles. Thus with the present machine, upon any article, a maximum number of characters may be engraved equal to the total number of the engraving units of the machine,

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but any less number of characters may be engraved by rendering engraving by any unit ineffective through non-supply of it with a proper engraving tool. And, of course, with my invention, the number of radially disposed engraving units around the circular table may vary in accordance with the design of the machine and the number of units which are initially selected for the machine to contain.

It is a primary object and purpose of the present invention to produce a very practical and sure engraving machine for the engraving upon metal or other material, desired letters or other characters at selected places with reference to each other, on the surface in which they are cut, and to provide the machine with cam means for governing the paths of movement of the engraving tools to cut in accordance with a predetermined letter or character, such structure being of a novel character and with the machine attendant required merely to place the articles in succession in the machine at the entrances or loading station.

It is a further object and purpose of the present invention to produce a very novel and efficiently operating engraving machine by means of which great rapidity in production is attained. Many other objects and purposes of the invention will appear and be understood from the following description, taken in connection with the accompanying drawings of a practical embodiment of the invention, in which drawings:

Fig. 1 is a side elevation of the machine with parts thereof shown in vertical section.

Fig. 2 is a fragmentary plan view thereof.

Fig. 3 is a fragmentary enlarged elevation with parts in vertical section on the plane of line 3—3 of Fig. 2, showing one of the engraving units in operative position as it is when performing its office.

Fig. 4 is a fragmentary horizontal section and plan view through an engraving unit adjacent the lower portion thereof, illustrating the cam control thereof.

Fig. 5 is a fragmentary enlarged vertical section through the machine at a side of the article ejector which is fragmentarily shown, in side elevation.

Fig. 6 is a horizontal section on the plane of line 6—6 of Fig. 1, looking in a downward direction.

Fig. 7 is a fragmentary enlarged elevation, partly in section of the engraving tool and the chuck or collet which holds it.

Fig. 8 is a fragmentary perspective view of a

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portion of a piston ring having an indicating word at the upper side thereof of the character which may be engraved with the machine of my invention.

Fig. 9 is a plan view of a fixture used in development and perfecting cams, two of which are used with each engraving unit for controlling the path of movement of its engraving cutter, and

Fig. 10 is an elevation thereof.

Like reference characters refer to like parts in the different figures of the drawings.

In the construction of the machine, a main supporting base 1 has a circular top or table 2 around the outer edges of which is a vertical depending skirt 3 upon which, at a number of spaced apart points, rollers 4 are mounted being located outwardly of the skirt and turning about horizontal axes which are continuations of radii of the skirt 3. Upon the rollers 4, an annular table of ring form is mounted for movement, having a horizontal section 5 from the inner portions of which a depending annular flange 6 extends to and rides upon said rollers 4.

Within the main housing support 1 a motor 7 is mounted, which through suitable pulleys and a belt 8, is connected with a speed reducer housed within the housing 9 for driving a vertical shaft 10. The shaft 10, by means of a clutch, the members of which are shown at 11, one movable and out of engagement with the other by operation of a handle 12 (Fig. 1), may drive a vertical shaft 13 in alignment with the shaft 10 when the clutch is connected. A gear 14 on the shaft 13 drives a gear 15 in mesh therewith which is mounted at the lower end of a short shaft carried on and extending below the table 2. The gear 15 is connected by a link 16 (Fig. 6), between the ends of an arm 17 loosely mounted about the shaft 13, the connection of the link 16 to the gear 15 being a distance outwardly from its center, whereby on continuous driving of the gear 15, arm 17 is swung back and forth in a simple harmonic motion. Said arm 17 extends through a slot 18 of the necessary length made in the skirt 3. At its outer end, it carries a pivotally mounted spring actuated dog 19 which, upon the movement of the arm 17 in a clockwise direction (Fig. 6), is brought into successive engagement back of inward projections 20 on the flange 6. This engagement back of a projection 20 occurs substantially at an extreme of movement of the arm 17 in such clockwise direction. And such movement being followed by a reverse or counterclockwise direction of movement of the arm 17, the flange 6 and the attached table portion 5 thereof are moved a predetermined distance, that is one step of movement with each complete revolution of the shaft 13. The number of projections 20 for the dog 19 to engage therewith is equal to the number of engraving units of the machine plus two, that is, one for the loading station of the machine and one for the ejecting station. Said projections 19 are spaced equal distances apart.

At its outer peripheral portions, the horizontal section 5 is thickened vertically as at 5a, and provided with a continuous way around it for the reception of heads of T-bolts to adjustably mount brackets having spaced outwardly and upwardly extending arms 21 at and around the outer edge portions of the table 5. A substantially horizontal bed 22 is pivotally connected adjacent its outer edges at 23 on each of said brackets and at its outer edge has an upwardly extending rib 24 through which a screw 25 is passed. At its inner edge portions the carrier 22 is formed with an

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upwardly extending rib 22a. A base 26 is located against the upper side of the carrier 22 at its inner edge bearing against the rib 22a and at its outer edge engagable by the end of the screw 25 to securely but releasably hold the base member 26 in place. Such bases 26 are preferably of a hardened material, at least at its surface portions and each has a horizontal upper face upon which a piston ring 27 is laid. It is to be understood that the structure described is duplicated, being likewise in number equal to the number of engraving units mounted on the machine plus two, and said bases 26 upon which the rings 27 are placed may be of varying thicknesses to conform to the varying axial widths of the rings 27. At the loading station (Fig. 2) the rings may be successively inserted in place upon the base members 26 as they come in succession to the place of loading by moving the ring inward between a side gauge 28 extending upwardly from the base 26, and a yielding spring 29 mounted thereon substantially diametrically opposite the gauge 28, being frictionally held in place by the spring and at its inner side coming against a stop 30 (Fig. 2) which is adjustably mounted upon an upward thickened peripheral portion 2a of the stationary circular top 2.

For each of the engraving units 8 as shown in Fig. 2, a supporting base casting 31 is provided, at its inner end having a vertical journal 32 adjustably connected to the upwardly thickened portion 2a of the top 2 of the main support grooved to receive T-bolts, as shown in Fig. 3, whereby each unit may be properly positioned with respect to the rings 27 coming successively thereto. A vertical shaft 33 is mounted upon and extends through the journal 32, at its upper end having secured upper and lower spaced cams 34 and 35, and below the cam 35 a third cam 36 is secured. The cams 34 and 35 are of flat relatively thin metal having cam edges, while the cam 36 is cut away for a portion of its under side adjacent its periphery, as shown. The continuously driven shaft 13 (Fig. 1) has a gear 37 connected therewith, which meshes with gears 37a, one secured at the lower end of each of the shafts 33 of the units so that all of said shafts 33 of all of the engraving units are simultaneously turned.

A vertical pin 38 extends through the base support 31 of each unit, at its upper end bearing against the lower side of the cam 36, and at its lower end against the upper side and at the inner end of a lever 39 pivotally mounted between its ends on the base 31 and extending under the inner free end of the member 22. As the annular table 5 is moved from one position to the next, the inner end of the plate 22 is lowered by reason of the upper end of pin 38 being received in the recessed portion of the cam 36, but with the rotative movement of said cam 36, pin 38 is forced downwardly lifting the member 22 and the piston ring 27 above it to clamp the ring against the under side of a bracket 40 connected to and extending outwardly from the base 31. Such bracket (Fig. 3) at its outer end is divided for the engraving tool to pass between the forks thereof to reach the ring 27.

A post 41 is either permanently connected or integrally formed with each of the base members 31 and carries a vertical casting 42, the lower end of which has an inwardly extending portion 43 directly connected with the post 41. At its upper side two idle rollers or pulleys 44 are mounted to turn upon vertical axes. Said casting 42 at its front side and adjacent its upper end has a ver-

tically adjustable plate 45 mounted and manually adjusted by means of a screw 45 passing through an overhanging plate 47, the screw carrying an indicating dial 48 for information as to the quantity or extent of vertical adjustment done.

An arm 49 extends outwardly from the plate 45 in a horizontal direction. Between its ends it has an enlargement of generally spherical form as shown at 50. A member 51 is mounted for universal movement upon the spherical enlargement 50 having upper and lower arms extending inwardly above and below said part 50 which carry headed seats 52 having concave recesses complementary to the spherical surface of the part 50. The arm 49 extends through the member 51 and at its outer end has a roller 52a bearing at opposite sides against the forked outer end of the member 51, as shown (Fig. 2).

A depending casting 53 is permanently secured to the lower side of the member 51, extending downwardly in a substantially vertical direction and at its inner side having horizontal upper and lower bearing or journal arms 54 and 55 through which a vertical shaft 56 passes. At its upper end it is equipped with a driving pulley or wheel 57. At its lower end it is provided with a collet or chuck 58 for the detachable connection of the engraving tool 59 which is to cut at its lower cutting end a character the outline of which as later described is controlled by the cams 34 and 35.

A short distance inwardly of the lower journal 55 a vertical post 60 is secured to and extends above the base member 41 of each of the engraving units. At its upper portion it passes through a vertical sleeve 61 which has a lever arm 62 extending inwardly to bear against its adjacent cams 34. A second arm 63 of the lever extends outwardly and bears against a projecting arm 64 secured to the lower journal 55 of the suspended casting 53 so that a movement of the arm 62 in an outward direction, induced by the cam 34 will swing the entire structure carrying the shaft 56 in one direction. A spring 65 between the arm 62 and posts 41 maintains said arm 62 against the edge of the cam 34. A second spring 66 between the arm 63 and the suspended bracket 53 holds said arm 63 against the part 64.

The lower cam 35 of each of the units likewise has an arm 66 of a lever bearing against it (Fig. 3) which extends inwardly from a sleeve 67 on the fixed post or rod 60 below sleeve 61. From said sleeve 67 a second arm extends substantially at right angles to the arm 62 and is held against an arm 69 at right angles to the arm 64 and integral therewith by a spring 70 (Fig. 4). Therefore, upon actuation of this lower lever by the cam 35, the shaft 56 and the supporting bracket structure therefor may be swung in a direction inward and outward at right angles to the direction of movement imparted by the upper cam 34 through the lever bearing against it. Thus there is a universal movement provided for the engraving tool 59 and the center about which such movement takes place is the center of a spherical enlargement 50 previously described.

All of the shafts 56 and the engraving implements carried thereby are driven in unison. A U-shaped support having an arm 71 permanently secured at the under side of the top 2 extends under the annular table 5. It has a vertically extending portion 71a and a return bent upper arm 71b, which is equipped with bearings to mount a horizontal shaft 72 at the inner end of which a driving wheel or pulley 73 is secured. A motor 74 mounted on the main casting support

of the machine drives shaft 73 by means of a belt 75 (Fig. 1).

From adjacent the inner end of the upper arm 71b a yoke 76 mounted at its upper end at 77 to swing about a horizontal axis depends below the drive pulley 73, the two sides of the yoke (Fig. 2) connecting with a horizontal plate 78 at their lower ends between which and the upper arms 71b a tension spring 79 is located normally tending to pull said plate to the right (Fig. 1), and tension a drive belt, later described. At the under side of the plate 78 two plates 80 are adjustably mounted by means of bolt and slot connections indicated in Fig. 2, and each at its outer end carries an idle pulley 82.

An endless belt 83 passes over the drive pulley 73 and underneath both idle pulleys 82, thence to one of the idle rollers 44 of each of the units next adjacent the loading and ejecting stations, is then passed around the pulley 57 of the shafts 56 of such units and back in engagement with the second of said idle pulley 44 of the next adjacent unit, and the belt continued around all of the driving pulleys 57 of all of the units (Fig. 2). Motor 74 when in operation drives all of the shafts 56 in unison and at the same speed of rotation.

After a piston ring which has been placed in the machine at the loading station (Fig. 2) has been moved by step by step movement in a counterclockwise direction underneath the several engraving units, any selected number of which may be in operative condition, so as to engrave either one or eight characters, or any number in between as selected, and has come to and passed by the last of said units, it is ejected. The loading station is at the back stop 30 (Fig. 2). The ejecting station is one step back thereof. At such ejecting station (Figs. 1, 2 and 5) spaced radial guides 84 are connected with a supporting block 85 bolted to the annular ring portion 2a of table 2 of the main support. Between the guides a slide ejector 86 is mounted. At the upper end of the continuously operated drive shaft 13 a crank 87 is secured. A connecting rod 88 is secured to the slide at one end and to the crank at the other so that with each revolution of the shaft 13 a complete reciprocation of the ejector bar 86 takes place. Said bar at its outer end has spaced apart stirrup sides 89 between which a short lever 90 is pivotally mounted between its ends. At the front end of the lever 90 a vertical ejecting pusher 91 is secured having a ring engaging point at its lower end. On the outward movement of the ejector bar 86, the ring 27 is engaged by the pusher 91 and forced outwardly as shown in Fig. 2.

The cams 34 and 35 are developed for any desired character which may be selected to be engraved. The method of development is indicated in Figs. 9 and 10, in which said cams are mounted upon suitable short posts 92, on a base plate 93, spaced from each other. Actuating arms 94 are pivotally mounted between their ends on the plate and made to follow the outlines of the character shown at 95 which the cams, when properly developed, will serve to move and actuate the engraving tool so that it follows the path of the character which is to be engraved. Such cam development is not a part of the invention and the detail of development and production need not be entered into. In the previous figures of the drawings where the cams are shown, they are not in their complete developed stage. Fig. 9 is indicative of the general character of the edge formation of said cams, and in any case two cams to control a particular letter or character

will be different in outline from any other two cams used for the engraving of a different letter or character.

In Fig. 8 the piston ring 27, a fragmentary portion of which is shown, is as it appears after the three letters at 96 have, in succession, been engraved to indicate the side of the piston ring which is to be installed up in a piston ring groove. For engraving the three letters of course only three of the units will be operative although all of the units may be driven. The three units which are operative will each carry the engraving implement 59, and the others not in service will have such engraving implements removed so that rings may pass thereunder without action being processed only by such units as have engraving tools connected therewith. For a greater number of the characters to be engraved, or a less number between the minimum of one and the maximum of eight in the machine illustrated (Fig. 2), the set up of the machine will necessitate engraving tools for the number of engraved characters which are to be produced.

The machine disclosed and described is very effective for rapid metal engraving. It has proved particularly useful for engraving indicating words or characters on piston rings, the characters being cut without disturbing the body of the ring or distorting the metal adjacent the characters as would occur by stamping such characters therein. The rotating of the engraving tools is rapid so that the metal is rapidly cut from the body of the article engraved and a complete character is engraved by each operating unit with each rotation of the driving shaft 13, followed immediately by a turning movement of the article carrying annular table 5 in a step of movement, from a station where a character has been processed to the succeeding station for processing the succeeding character. The independent adjustable connection of the engraving units upon the supporting top 2 permits each to be properly located to have the several characters which are engraved properly spaced from each other and not overlap, and permits change of set up for different engravings to be done.

The invention is defined in the appended claims and is to be considered comprehensive of all forms of structure coming within their scope.

I claim:

1. In a construction as described, an article carrier, an engraving unit extending above said article carrier and an article thereon, a vertically mounted shaft, an engraving tool at the lower end thereof, supporting means for said shaft mounted a distance above said tool providing universal movement about a vertical axis, means for continuously driving said shaft, two cams, and means interposed between said cams and said suspended shaft support for moving the engraving tool in accordance with a predetermined path of movement governed by said cams, and means for driving said cams.

2. A construction as defined in claim 1, means for pivotally mounting said article carrier to turn about a horizontal axis for lifting an article carried thereby toward the engraving tool, and additional cam means connected with said first mentioned cams, combined with means interposed therebetween and said article carrier, for elevating the article carried thereby into position to be processed by the engraving tool.

3. In an engraving machine, a horizontal support, a bed pivotally mounted to turn on a horizontal axis, a base at the upper side of said bed,

a pivotally mounted lever extending under the free side of the bed for controlling a raising and lowering thereof, a vertically mounted shaft located over said base, means carrying said shaft mounted for a universal movement about a center located above the upper end of the shaft, means to drive said shaft, said shaft at its lower end having means for the detachable connection of an engraving implement, two cams, means for rotating said cams, means interposed between said cams and said shaft carrying means for moving in a predetermined path the shaft and an engraving tool carried at the lower end of said shaft and a third cam movable with the other cams for actuating said lever to elevate the base to cause engagement of an article carried thereby with said base with said engraving tool.

4. A construction as defined in claim 3, and a rigidly supported bracket extending over an article to be engraved which is carried by said bed and base, against which said article to be engraved is pressed upon elevation of the inner side portion of the base.

5. In an engraving machine, a horizontal support, a bed mounted for vertical movement relative to said support, a releasable and replaceable base connected to said bed at its upper side adapted to have an article to be engraved located thereon, means for releasably holding said article on the base, means for engraving said article at its upper side including a driven shaft and an engraving cutting tool at the end thereof adjacent said base, means for mounting said shaft, means for moving said shaft mounting means and for controlling its movements to cause an engraving tool to make a predetermined path of movement, means for driving the shaft, means for elevating said bed and the base carried thereon to lift an article to be engraved into operative position with respect to said engraving tool, and means for clamping the article to be engraved against said bed upon the lifting thereof.

6. An engraving machine comprising, a movable horizontal table, a fixed horizontal table with reference to which the movable table moves, a plurality of article carrying members mounted upon said movable table in spaced relation to each other, means for moving said movable table in periodic steps of movement distances substantially equal to the spaces between said article carrying members, an engraving unit mounted on the fixed table, a vertical driven shaft forming a part of said engraving unit adapted to have an engraving tool detachably secured at its lower end, said engraving tool being located above an article carrying member brought beneath it, means for driving said shaft, means for mounting the shaft for universal movement about a center located above its upper end, and driven means for moving said shaft about said center to cause the engraving tool to follow a predetermined path of movement, said article carrying members each comprising a pivotally mounted bed mounted to turn about a horizontal axis at the outer side and said movable table, means for carrying an article to be engraved on and above each of said beds, and means operated in unison with said driven means for controlling the movements of said shaft about said center for elevating the inner edge portions of said beds to lift the article to be engraved into engraving position with reference to the engraving tool.

7. An engraving machine comprising, a movable horizontal table, a fixed horizontal table with reference to which the movable table moves, a

plurality of article carrying members mounted upon said movable table in spaced relation to each other, means for moving said movable table in periodic steps of movement distances substantially equal to the spaces between said article carrying members, an engraving unit mounted on the fixed table, a vertical driven shaft forming a part of said engraving unit adapted to have an engraving tool detachably secured at its lower end, said engraving tool being located above an article carrying member brought beneath it, means for driving said shaft, means for mounting the shaft for universal movement about a center located above its upper end, and driven means for moving said shaft about said center to cause the engraving tool to follow a predetermined path of movement, said article carrying members each comprising, a pivotally mounted bed mounted to turn about a horizontal axis at the outer side of said movable table, means for carrying an article to be engraved on and above each of said beds, means operated in unison with said driven means for controlling the movements of said shaft about said center for elevating the inner edge portions of said bed to lift an article to be engraved into engraving position with reference to the engraving

ing tool, and clamping means against which an article to be engraved is pressed upon elevating a bed and the said article to be engraved carried thereby.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
790,328	Swayze	May 23, 1905
889,386	Mehl	June 2, 1908
1,463,505	Fretter	July 31, 1923
1,617,632	Gillespie	Feb. 15, 1927
1,628,751	Smith	May 17, 1927
1,770,457	Castonguay	July 15, 1930
2,019,072	Clemens	Oct. 29, 1935
2,073,111	Lindgren	Mar. 9, 1937
2,293,100	Baumgold	Aug. 18, 1942

FOREIGN PATENTS

Number	Country	Date
557,767	Great Britain	Dec. 3, 1943