April 30, 1946. A. SIMONS 2,399,397

MARKING OR EMBOSSING MACHINE

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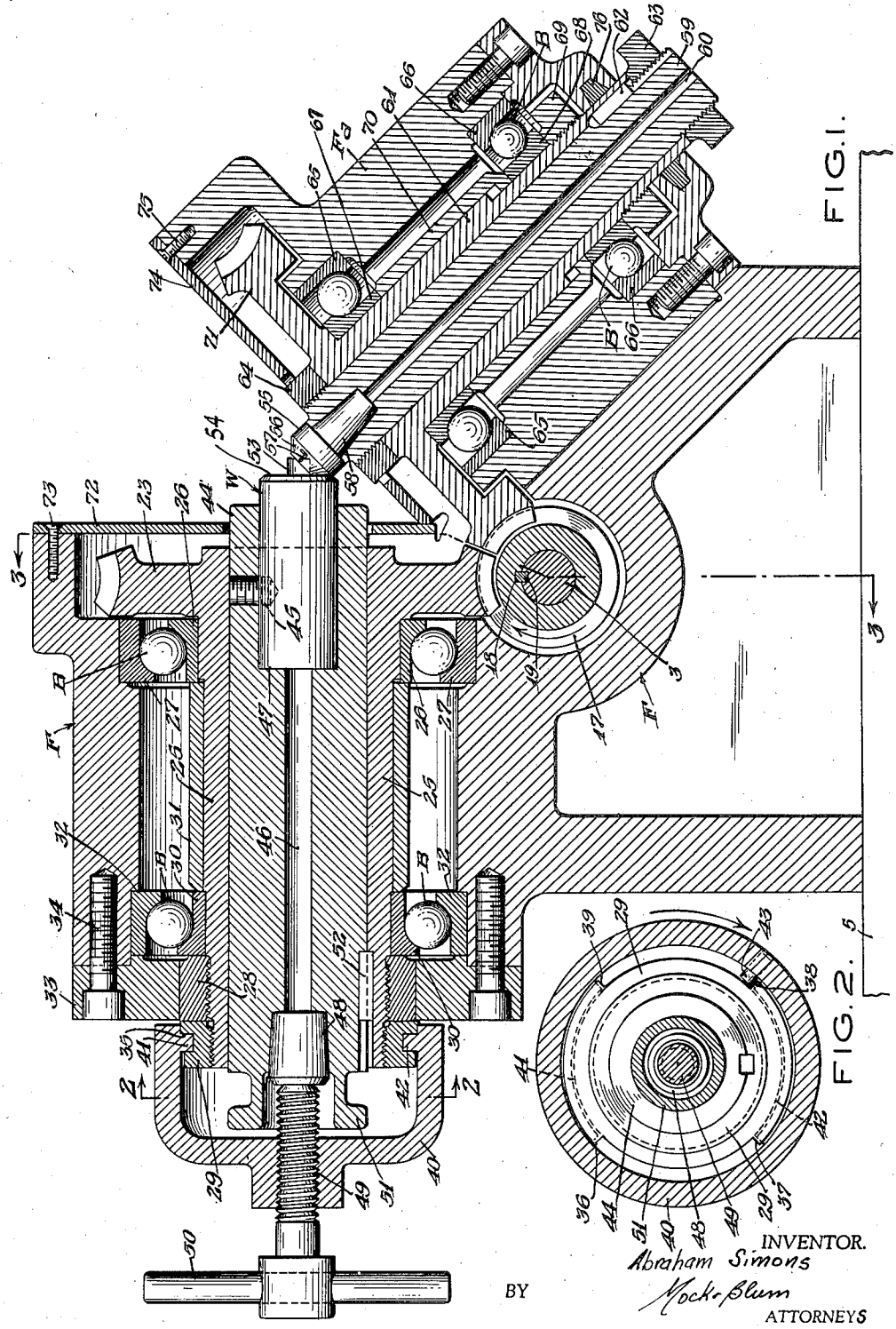


FIG. 1.

FIG. 2.

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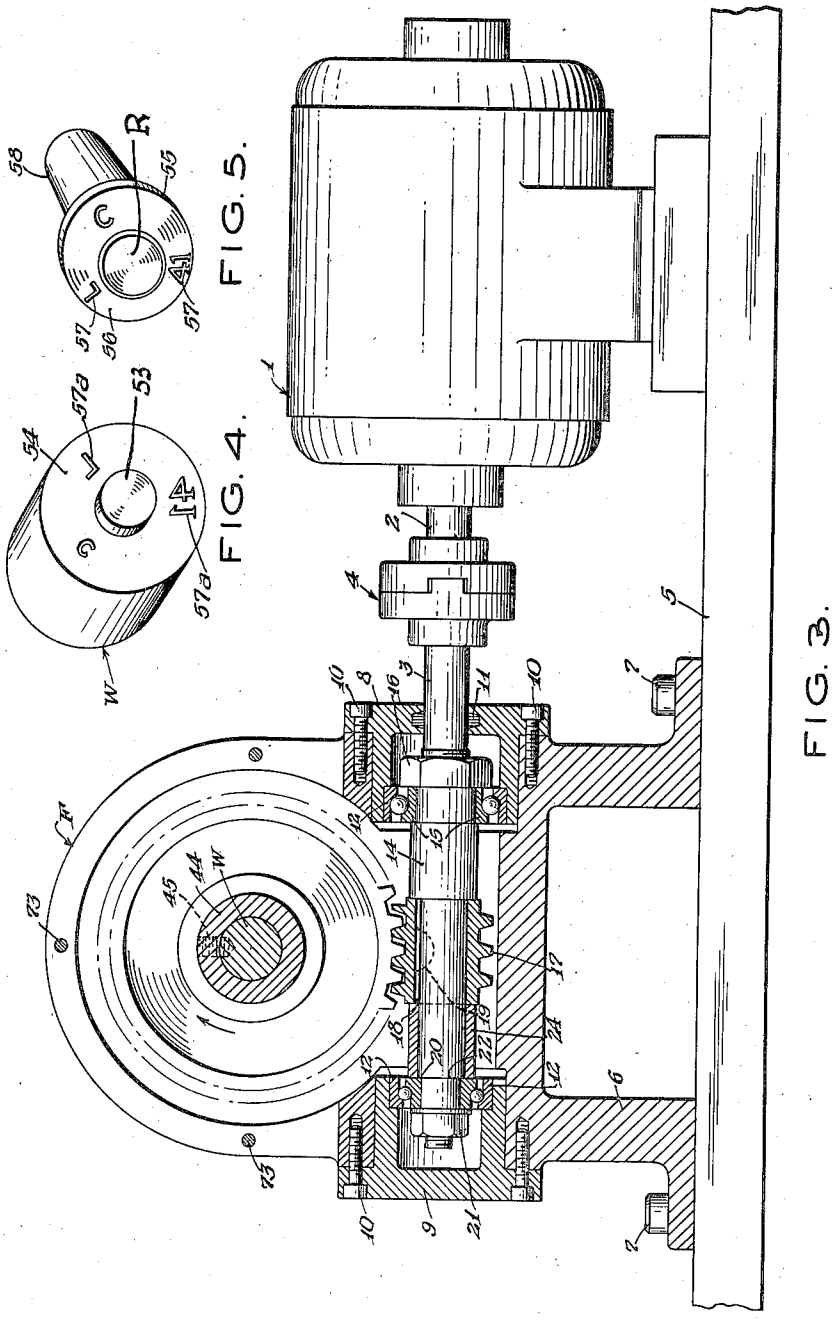


FIG. 3.

FIG. 4.

FIG. 5.

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UNITED STATES PATENT OFFICE

2,399,397

MARKING OR EMBOSSING MACHINE

Abraham Simons, New York, N. Y.

Application December 3, 1941, Serial No. 421,402

4 Claims. (Cl. 101—7)

My invention relates to a new and improved marking or embossing machine.

One of the objects of my invention is to provide a machine by means of which markings can be readily made in a metal body.

Another object of the invention is to provide a simple and efficient mechanism which can form the markings under great pressure, by inwardly forcing the material of the metal object, in order to form a projecting marking, which may be a number, a letter, or other stamping marking.

Another object of the invention is to provide a mechanism which will eliminate the use of hydraulic pressure. The method is particularly useful in marking dies, punches, bunters, and tools of various kinds, which require great pressure in order to form the marking, and which must be marked, in order to stamp other objects, such as cartridge cases and the like.

According to my invention, a marking wall is provided with an offset marking element or elements. The marking element is brought under pressure, into progressive contact with the surface of the object which is to be embossed, as distinguished from full-face contact in which the entire marking element is simultaneously contacted with said surface. Said pressure is sufficient to form an offset marking in said surface. Said pressure is less than the pressure which would be required to form said offset marking, if said surface made full-face contact with said marking element. The pressure is insufficient to distort the bunter or the like, save at said surface.

Another object of my invention is to provide a mechanism whereby the marking element is applied by rolling pressure against the surface to be embossed.

Other objects of my invention will be stated in the annexed description and drawings, which illustrate a preferred embodiment thereof, it being understood that the above statement of the objects of my invention is intended generally to explain the same without limiting it in any manner.

Fig. 1 is a vertical sectional view of the improved machine.

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

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

Fig. 4 is a perspective view of a punch, illustrating embossing markings which have been made by the improved machine.

Fig. 5 is a perspective view of the tool which is used for making the markings which are shown in Fig. 4.

Referring to Fig. 3, the motor 1, which may be an electric motor or other conventional motor, is provided with a shaft 2, which drives the main drive shaft 3 of the machine, by means of any conventional flexible coupling 4. The motor 1 and the improved machine are mounted upon a common support 5. The base of the improved machine is provided with legs 6, which are connected to the support 5 by conventional fastening members 7.

The frame F of the improved machine is provided with detachable caps 8 and 9, which are connected to said frame F of the machine by means of fastening members 10. The drive shaft 3 is provided with a suitable loose fit in the cap 8, and said cap 8 is provided with the usual oil-tight packing 11, in order to retain oil in the ball-bearing and worm-drive.

The outer races 12 of conventional ball bearings, are fixed to the caps 8 and 9. The outer races 12 may be fixed to the caps 8 and 9, by means of a drive fit, so that said outer races 12 can be detached from said caps 8 and 9, by suitable force. During the operation of the machine, the outer races 12 and the caps 8 and 9 remain stationary. The drive shaft 3 is provided with an enlarged portion 14, in order to provide shoulders at the respective ends of said enlarged portion 14. The inner ball race 15 is clamped against the adjacent shoulder of the enlarged portion 14, by means of a nut 16, which is turnably mounted upon a corresponding threaded portion of the shaft 3. The inner race 15 turns in unison with the shaft 3.

One end of the worm 17 abuts the corresponding shoulder which is provided by the enlarged portion 14. The portion of the shaft 3 on which the worm 17 is mounted, is provided with a conventional key-way 18, and the conventional key 19 connects the worm 17 to the shaft 3, so that the worm 17 is turned in unison with the shaft 3.

The inner race 20 in the cap 9 is clamped by the nut 21 against the shoulder 22 of the shaft 3, so that said inner race 20 turns in unison with shaft 3. The nut 21 is mounted upon a corresponding threaded portion of the shaft 3. A rigid cylindrical spacer 24 is located between the race 20 and the respective end of the worm 17.

The worm 17 meshes with a worm gear 23. Said worm gear 23 is integral with a hollow shaft 25. Said worm 17 and said worm gear 23 constitute speed-reducing means, which can be replaced by other speed-reducing means. As an

example, if the shaft of motor 1 turns at 1200 revolutions per minute, the hollow shaft 25 and the article W may be turned about 60 revolutions per minute. This ratio can be varied at will. An inner race 26 is connected by a suitable drive fit to this hollow shaft 25. This inner race 26 is associated with an outer race 27 which is fixed to the frame F of the machine. An internally threaded ring 28 is screwed upon a respective threaded part of the hollow shaft 25, and another ring 29 is screwed upon another corresponding threaded part of said hollow shaft 25. Ring 28 abuts the inner race 30, and the ring 29 abuts the ring 28. The respective abutting relations of other parts are shown in the drawings, which are substantially to scale, and which show other details. Inner race 30 is located longitudinally between the ring 28, and a cylindrical spacer 31. The ends of said spacer 31 respectively abut the races 30 and 26. The inner race 30 is associated with an outer race 32, which is fixed to the frame F, by a drive fit or the like. A cap 33 is fixed to the frame F, by means of screws 34 or other suitable connecting means. A flange of said cap 33 abuts the outer race 32.

The ring 29 is provided with a continuous peripheral groove, which has a continuous end wall or flange 35 at one side thereof. The opposed end wall is broken away between the points 36 and 37 and also between the points 38 and 39, so that two quadrants of the last-mentioned end wall are omitted, leaving two intermediate wall quadrants. These intermediate wall quadrants of the last-mentioned end wall are between the points 36 and 39, and between the points 38 and 37.

The cap 40 is provided with quadrantal ribs 41 and 42, which are shown in locking position in Fig. 2. Said ribs 41 and 42 are therefore shown in broken lines in Fig. 2. In order to mount the cap 40 upon the ring 29, the ribs 41 and 42 are first pushed through the quadrantal open spaces between the points 38 and 39, and between the points 36 and 37. The cap 40 is then turned, until the ribs 41 and 42 are in the locking position shown in Fig. 2. The cap 40 is provided with a stop pin 43. When said cap 40 is in the locking position shown in Fig. 2, said stop pin 43 abuts one end of the quadrant which is located between the points 37 and 38.

Referring to Fig. 2, the rib 41 is originally pushed through the space between the points 36 and 37, and the rib 42 is initially pushed through the space between the points 39 and 38. The cap 40 is then turned clockwise, until the stop pin 38 is in the stop position which is shown in Fig. 2.

The article W, which is to be marked, is inserted into one end of a spindle-holder 44. The article W is fixed to the spindle-holder 44 by means of a clamping screw 45 or any other suitable means. Said article W is provided with a recess which said clamping screw 45 enters. Said spindle-holder 44 is provided with a longitudinal bore 46, and it is also provided with a shoulder 47. The article W abuts said shoulder 47, when said article W is clamped by the clamping screw 45. A hardened metal frusto-conical member 48 is inserted into a corresponding enlargement of the bore 46. The cap 40 is provided with a tapped bore, in which the clamping screw 49 is located. This clamping screw 49 is turned by means of a hand-hold 50, until the end of said clamping screw 49 exerts the necessary pressure upon the frusto-conical member 48. The spindle-holder 44 is removable from the hollow shaft 25, and for this purpose one end of the spindle-holder 44 is provided with a knob or hand-hold 51. The spindle-holder 44 is detachably fixed to the hollow shaft 25, by means of its locating key 52, which is inserted into a suitable key-way of the hollow shaft 25.

The force of the clamping screw 49 pushes the member 48 and the spindle-holder 44 forwardly or to the right, referring to Fig. 1. The reaction of this force urges the cap 40 to the left, thus forcing the ribs 41 and 42 against the corresponding quadrantal portions of the partial wall of the groove of the ring 29. This produces a frictional force which holds the cap 40 from turning relative to the ring 29. In the particular embodiment described, the article W has a projection 53, since said article W is a bunter or stamping die. The embossing markings or elements 57*a* are formed upon a planar lateral face 54 of the article W. These embossing markings 57*a* are formed by a marking member 55. In this embodiment, the marking member 55 is provided with a recess R, which receives the projecting end 53 of the article W. Said marking member 55 has a frusto-conical face 56, which is provided with the intaglio markings 57. The marking member 55 is provided with a frusto-conical shank 58 which fits in a corresponding recess of a sleeve or spindle-holder 59. Said spindle-holder 59 is provided with a bore 60, through which a tool can be pushed for ejecting the shank 58. The spindle-holder or sleeve 59 is located in a bearing sleeve 61, which is turned in unison with said spindle-holder 59. The spindle-holder 59 and the sleeve 61 are connected by means of a key 62 which is provided in the spindle-holder 59, and which enters a suitable key-way in the sleeve 61. A nut 63 is screwed upon one end of the spindle-holder 59. A corresponding nut 64 is screwed upon the other end of the spindle-holder 59, so that the spindle-holder 59 is held in adjusted position against any longitudinal movement relative to the sleeve 61. The spindle-holder 59 can thus be axially adjusted relative to bearing 61, in order to form the markings 57*a*, at the correct distance from the longitudinal axis of the article W. The sleeve 61 is mounted in a frame unit F*a*, which is suitably fixed to the frame F. This frame unit F*a* is provided with outer races 65 and 66 which are suitably fixed to said frame unit F*a*. The outer race 65 is associated with an inner race 67, which is fixed to the sleeve 61, and the outer race 66 is associated with an inner race 68 which is also fixed to the sleeve 61. A nut 69 is mounted upon a corresponding threaded portion of the sleeve 61, in order to hold the inner race 68 in position. A spacing collar 70 is located between the races 67 and 68. The sleeve 61 which can also be designated as a hollow shaft, is provided with an integral worm gear 71, which meshes with the worm 17. The worm gears 23 and 71 have identical pitches and their central planes make an angle of 45° with each other, in this embodiment, because the frusto-conical marking face 56 makes an angle of 45° with the longitudinal axis of the marking tool 55, in this embodiment. This can be varied at will. An oil-retaining cover 72 is fixed to the frame F by means of suitable holding screws 73, and an oil-retaining cover 74 is fixed to the frame unit F*a*, by means of screws 75.

An oil-tight packing 76 is provided around the sleeve 61.

Suitable anti-friction balls B are located between the respective races.

In this embodiment, the marking elements or portions **57** are recessed or intaglio, relative to the marking face **56**, so that the embossing markings **57***a* are formed in relief on the article W.

The operation of the device is as follows:

The screw **49** is turned to its release or non-clamping position, until the cap **40** can be and it is removed from the ring **29**. The spindle-holder **44**, together with its fixed key **52**, are then pulled out of the hollow shaft **25**, the direction of this movement being to the left of the operative position which is shown in Fig. 1. The article W is then inserted into the corresponding part of the bore of the spindle-holder **44**, and said article W is then clamped in position by means of the clamping screw **45**, whose outer end is either flush with the outer periphery of the spindle-holder **44**, or is countersunk relative to the outer periphery of the spindle-holder **44**. The spindle-holder **44**, with the assembled article W, is then moved to the operative position which is shown in Fig. 1, in which the key **52** enters the key-way of shaft **25**, by pushing said spindle-holder **44** to the right, through the hollow shaft **25**. The cap **40** is then moved to the position shown in Fig. 2, and the screw **49** is then turned so as to force the spindle-holder **44** to the right and to lock the cap **40** to the ring **29**. The adjacent walls of the spindle-holder **44** and of the hollow shaft **25** are cylindrical. Hence the pressure of the clamping screw **49** pushes the spindle-holder **44** to the right, until the face **54** of the article W abuts the corresponding frusto-conical marking wall **56** of the marking member **55**, under suitable pressure, said pressure being maintained by the clamping screw **49**, whose pitch is sufficiently small to make said screw **49** self-locking. The marking wall **56** of the marking member **55** therefore serves as a stop for limiting the movement of the spindle-holder **44** and of the article W, under the thrust of the screw **49**. The faces **54** and **56** make theoretical linear contact when the article W is in operative position. In practice, said faces are slightly flattened under the high pressure of the screw **49**. The motor **1** is now operated, thus turning the article W exactly in unison and at exactly the same speed of rotation as the marking member **55** which is frictionally driven by sleeve **59**.

It will be noted that since the marking positions or elements **57** of the marking wall **56**, are recessed or intaglio, that the embossing markings **57***a* on the article W are in relief, and said embossing markings **57***a* are reversed relative to the marking elements **57**.

By contacting the marking wall **56** with the face **54** of the article which is marked, under rolling pressure, clear and sharp embossing markings **57***a* can be formed with much less pressure, than if the entire marking wall **56** or if an entire marking element were simultaneously forced into contact with the face **54** to be marked. If a hydraulic press is used with an ordinary marking punch whose marking element makes full face contact with the object which is to be marked, a minimum pressure of about 80–90 tons per square inch is required, in order to form the embossing markings in a hard steel matrix. In order to allow for such pressure, the bunter must be provided initially with a dome-shaped face **54**, instead of a planar face. The material of the bunter yields under said high pressure, and the cylindrical wall of the bunter must be tightly enclosed while this high pressure is applied. After the embossing markings have been formed, it is necessary to harden the bunter. The distortion of the metal of the original shape of the bunter, under the old method, crystallized said metal, so that the hardened bunter tended to break. My improved method and machine eliminate these disadvantages, because I can use low pressure, under which the original shape of the article W is not distorted. According to my invention, the pressure screw **49** can be turned by hand in order to exert the necessary pressure, which is much less than the pressure which would be required if the wall **54** made full contact with one or more of the marking elements **57**. Clear and satisfactory markings have been secured by pressure which is secured by turning the screw **49** by hand. This pressure would be insufficient to form the markings **57***a*, if the wall **54** simultaneously made full contact with all the markings **57**.

Hence the improved device can be operated much more quickly and conveniently than a hydraulic press, and there is no danger of applying excessive stress to the article W which is to be marked. The improved device is also much more compact and much lighter than an hydraulic press.

It is clear that the improved method may be put into practice by numerous types of mechanism.

In the improved method, the marking elements **57** are caused to rotate about a fixed axis, and said marking elements are part of a marking wall **56** against which the article is forced, so that said wall **56** acts as a stop.

The article W is preferably initially forced under pressure to contact with a portion of the marking wall **56**, between the markings **57**. However, the invention is not limited to this feature.

The marking wall **56** may have one or more marking elements **57**.

The end of the spindle-holder **44** from which the article W projects when said article W is clamped to said spindle-holder **44**, may be designated as the front end of said spindle-holder **44**. The spindle-holder **44** is therefore rearwardly slidable out of the hollow shaft **25**. The rear end of the spindle-holder **44** projects rearwardly of said hollow shaft **25**. The member **40** may be designated as an abutment member which can be fixed to the frame, through the medium of the ring **29**. The member **48** may be designated as a second abutment member which receives the thrust of the screw **49**, which passes through a tapped bore of the member **40**. The spindle-holder **44**, the rings **28** and **29**, the cap **40** and the screw **49** and the member **48**, all turn in unison about the same axis, with the hollow shaft **25** and the article W. The screw **49** can be turned so as to increase its pressure, while said screw **49** is turned in unison with worm-gear **23**. This is preferred in actual practice, instead of applying the full pressure of screw **49**, before rotating the worm-gear **23**. The member **48** is turned by friction, in unison with spindle-holder **44**.

The marking tool **55** can be caused to turn in unison with the spindle-holder **59**, by means of friction.

The maximum pressure of screw **49**, in order to form clear embossing markings **57***a*, need not exceed a maximum of one ton, or only about one per cent of the pressure formerly required in the hydraulic press. The spindle-holder **44** and the article W can be rotated several times, in

order to form the embossing markings 57*a* in the same object W.

There is a slight, but sufficient clearance between ring 28 and cap 33, so that ring 28 can turn easily in unison with worm gear 23. Since the worm gear 23 is turned slowly, it is easy to turn the screw 49 in order to increase its longitudinal thrust, after said screw 49 and said worm gear 23 begin to turn about their common axis of rotation. The screw 49 can be turned to exert its final maximum thrust of about one ton per inch, before or after the worm gear 23 has turned a complete revolution.

The marking operation does not substantially distort the article W, save to form the embossing markings 57*a*. If the face 54 is planar before the embossing markings 57*a* are formed, said face 54 is substantially planar after said embossing markings or elements 57*a* have been formed. It is therefore not necessary to force the article W under great pressure into the spindle-holder 44, or to locate said article W with its entire cylindrical wall in contact with the inner cylindrical wall of spindle-holder 44, in order to prevent the distortion of said article W. Said article W can be easily inserted by hand into the spindle-holder 44, and after the markings 57*a* have been formed, said article W can be easily removed by hand from the spindle-holder.

I have shown preferred embodiments of my invention, but it is clear that numerous changes and omissions can be made without departing from its spirit.

In one aspect of the invention, the article W is rotated about its respective longitudinal axis by being connected to a first rotatable member. The marking tool is rotated about the respective longitudinal axis, by being connected, as by friction, to a second rotatable member. One of these rotatable members has an end-thrust bearing, such as the cap 40 connected to such rotatable member, so that said end-thrust bearing rotates in unison with said rotatable members. Said end-thrust bearing has end-thrust means, such as the members 49, 48, and 46, and said end-thrust means rotate in unison with said rotatable members. Said end-thrust means cause the face of the article W to contact under rolling pressure with the marking wall of the marking tool.

I claim:

1. A machine for marking an object, comprising a driven shaft, a first hollow shaft geared to said driven shaft, a second hollow shaft also geared to said driven shaft, the axes of said hollow shafts being inclined to each other, said hollow shafts being rotated at equal speeds by said driven shaft, a spindle-holder removably located in said first hollow shaft and turnable in unison with said first hollow shaft, a sleeve located in said second hollow shaft and turnable in unison with said second hollow shaft, a marking tool located in said sleeve at one end of said sleeve, said marking tool projecting out of said end of said sleeve and being turnable in unison with said sleeve, said marking tool having a marking wall which has a marking element, said marking tool being adjacent the front end of said spindle-holder, means for clamping the article which is to be marked to said spindle-holder at said front end of said spindle-holder, said article projecting out of said front end of said spindle-holder when said article is thus clamped, a face of said article then contacting with said marking wall, said spindle-holder being longitudinally slidable in said first hollow shaft, pressure means adapted to urge said spindle-holder forwardly towards said marking tool and for holding said face under pressure against said marking wall, said spindle-holder and the attached article being rearwardly slidable out of said hollow shaft.

2. A machine according to claim 1, said machine having a frame, said spindle-holder having its rear end also projecting rearwardly out of said first hollow shaft, an abutment member located rearwardly of said rear end, said pressure means comprising a longitudinal screw which passes through a tapped bore of said abutment member, and a second abutment member which abuts said rear end and which is turnable relative to said spindle-holder.

3. A machine for making an object, said machine comprising first rotatable-means for rotating said object about its longitudinal axis, second rotatable-means for rotating a marking tool about its longitudinal axis with a marking wall of said marking tool in rolling contact with a face of said object, end-thrust means connected to and rotating with one of said rotatable-means, said end-thrust means exerting force in the direction of the respective longitudinal axis of the respective rotatable-means to hold said marking wall under rolling pressure against said face, said marking wall having a marking which is offset relative to said marking wall, said end-thrust means exerting sufficient pressure to produce a marking in said face which corresponds to said offset marking.

4. A machine according to claim 3, including drive-means for rotating both said rotatable means simultaneously and at the same angular velocity.

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