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Noble et al.

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[54] **AUTOMATIC MARKING DEVICE FOR METAL OBJECTS**

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[52] **U.S. Cl.** **101/7,** 101/40, 101/379

[51] **Int. Cl.** **B41f 17/20**

[58] **Field of Search** 101/7, 8, 379

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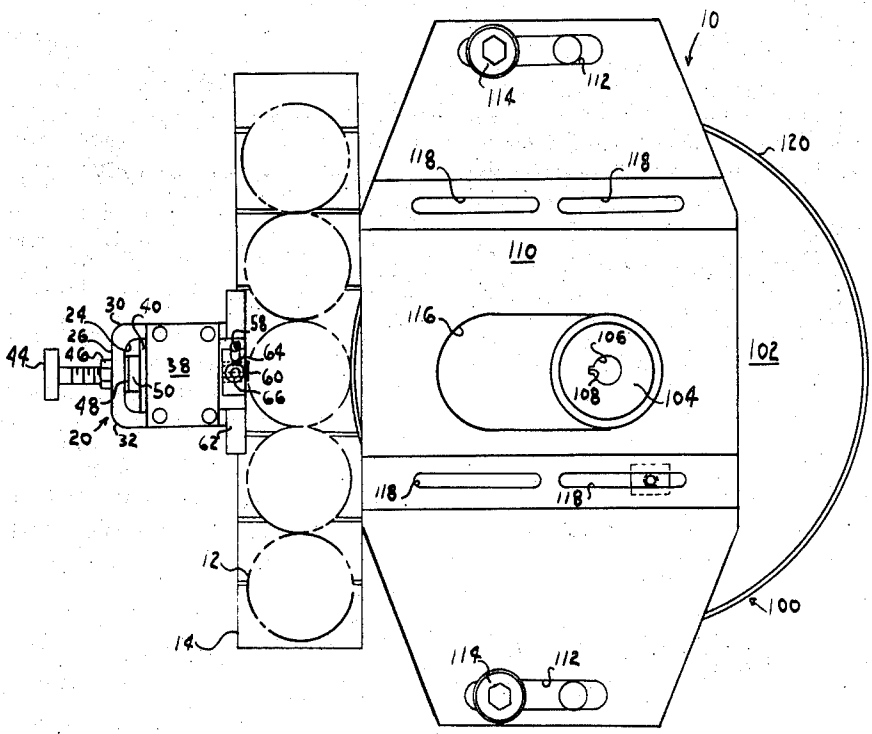
[57] **ABSTRACT**

A device for marking metal objects having a conveyor which carries the object to be marked to a marking station positioned between a marker assembly and a drive assembly. The marker assembly includes a housing in which are mounted a chase for holding a plurality of type dies and a block slidable in the housing which forcibly engages the chase by the action of a set screw acting through the block to maintain the desired force upon the chase and type. The marking assembly is connected to the frame of the device by an adjustment assembly which enables adjustment of the angle between the type dies and the preselected surface of the object to be marked. The drive assembly includes a rotating disc mounted in the frame of the device and adjustable in position along a line perpendicular to the line of travel of the objects to be marked past the marking station. The drive disc rotates against the object to be marked to rotate that object in the direction opposite to its direction of linear travel past the marking station to enable the placement of a plurality of marks on the surface of the object. A ring of urethane or other resilient material is mounted around the circumference of the drive disc, and a block of urethane or other resilient material is mounted in the marking assembly between the rear of the chase block and the adjusting screw to absorb partially and limit the forces and stresses applied to the object being marked by the interaction of the marking assembly and the drive assembly.

3 Claims, 5 Drawing Figures



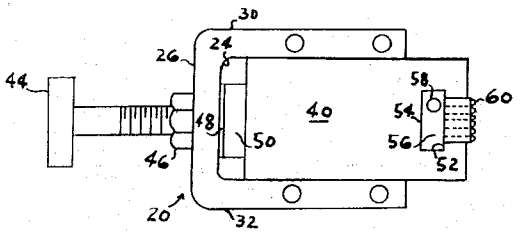


Fig. 3.

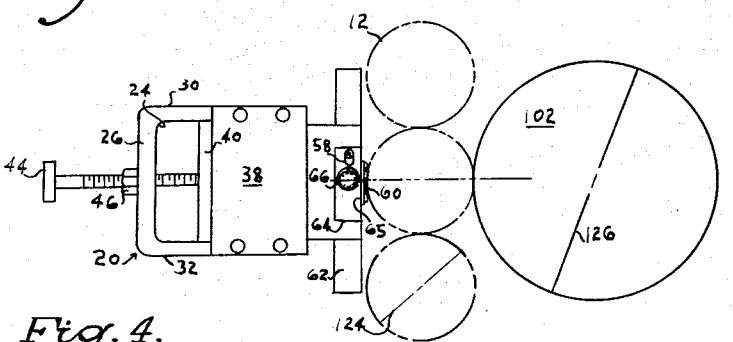


Fig. 4.

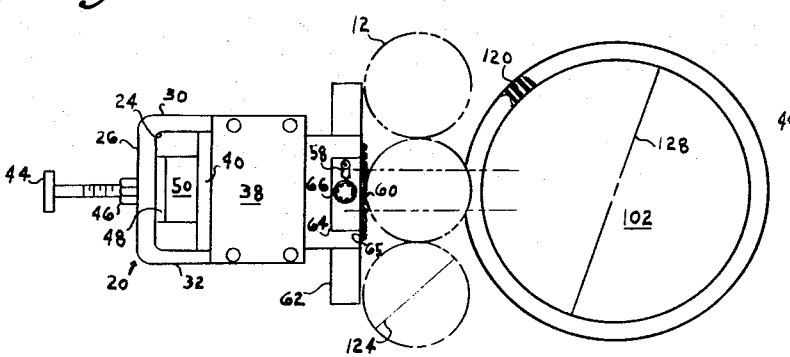


Fig. 5.

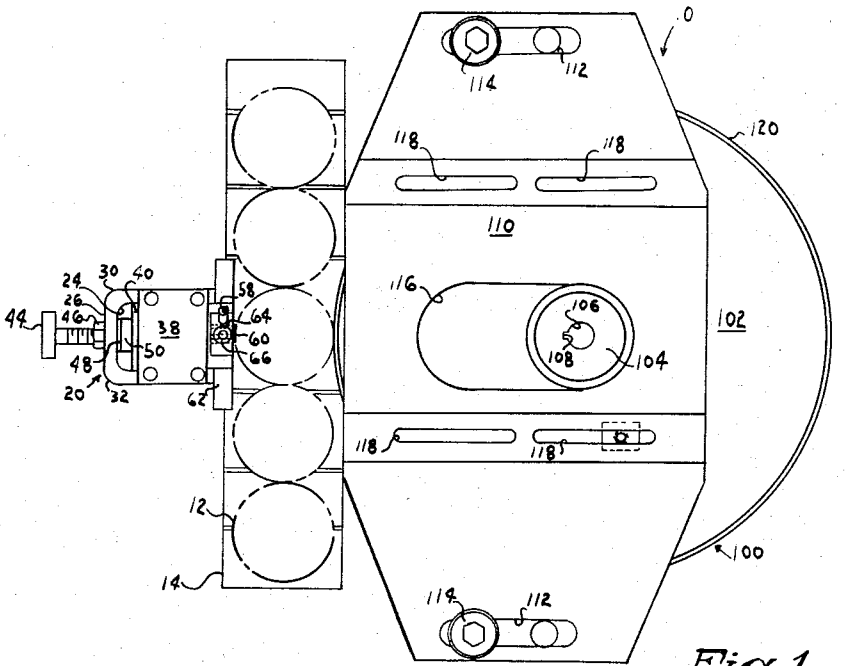


Fig. 1.

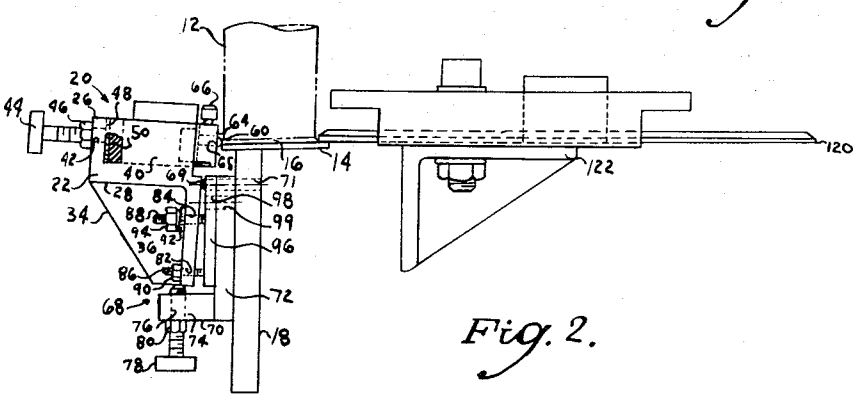


Fig. 2.

AUTOMATIC MARKING DEVICE FOR METAL OBJECTS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to marking devices for solid objects and, more particularly, pertains to devices for marking by indentation the surface of cans, aerosol containers, bottle tops or other metal objects.

2. Description of the Prior Art

There are known and described in the art several types of automatic marking devices for marking, by indentation of the metal surface, a succession of cans, aerosol containers, bottle caps and similar containers. Such marking devices can process and mark up to several hundred containers a minute while placing on each container a reasonably legible mark of up to five or six characters.

Not uncommonly, however, the passage of an oversized, or otherwise irregular or damaged container, through the marking device results in damage to the container, impairment of the integrity of the mark, or interruption of the continuous automatic operation of the marking device.

A particularly efficient marking device provides a container conveyor passing between a stationary marking assembly and a rotating drive disc which rotates each container opposite to its direction of linear travel against the marking device, thereby imprinting on a surface of the container a five or six character mark while enabling the processing of several hundred containers per minute.

There is a need for a high speed automatic metal marking device employing a stationary set of marking dies coacting with a rotating drive disc and capable of compensating for variations in container size due to damaged containers or oversized containers. It is also desirable to provide an automatic metal marking device which can be adjusted for variations in size or configuration of certain container dimensions.

SUMMARY OF THE INVENTION

The marking device for metal objects of this invention includes a frame having mounted thereon, opposite each other, a drive assembly and a marking assembly which includes a set of type dies forcibly urged against the preselected surface of the metal object to be marked. The marking assembly is mounted on the frame of the device by an adjustable mounting assembly operable to adjust the angle and orientation of the marking assembly and type dies relative to the preselected surface to be marked. The drive assembly includes a rotating disc adjustable transverse to the line of travel of the object to be marked and operable to rotate that object in the direction opposite the direction of linear travel of the object to effect the placement of a series of marks on the object. The drive disc has a resilient circumferential member to engage the surface of the metal object, and the marking means has a resilient member behind the marking dies, both resilient members being operable to reduce the force and stress imposed on the object by the marking device in operation and to yield sufficiently to permit continuous effective operation with damaged or oversized metal objects.

It is an object of this invention to provide a continuous metal marking device having a plurality of stationary type dies and driven by a rotating disc capable of accommodating and adjusting for variations in size and configuration exhibited by damaged or oversized objects without interruption of the continuous high speed operation.

It is a further object of this invention to provide an automatic metal marking device capable of marking, in a metal surface, a field of characters of from six to nine, or more, legible characters.

It is an additional object of this invention to provide an automatic metal marking device having a marking assembly that is adjustable through a substantial vertical angle relative to the marking station to provide effective adjustment of the marking assembly for variations in the configuration and orientation of the marking surfaces of different containers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of the metal marking device of this invention.

FIG. 2 is a view in side elevation and partially in section of the apparatus shown in FIG. 1 and showing the internal structure of the marking assembly and the structure of the marker adjusting assembly.

FIG. 3 is a partially fragmented top plan view of the marker assembly, with the cover plate removed, showing its internal structure.

FIG. 4 is a diagrammatic representation of the effective length of the marking station provided by a prior art marking device without the resilient marking and drive members.

FIG. 5 is a diagrammatic representation, partially in cross section, of the increased effective length of the marking station provided by the marking device of this invention including the resilient drive member and the resilient marking member.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings, the metal marking device is referred to generally by reference numeral 10. The metal objects to be marked are shown in the drawings as a plurality of metal cans 12 for purposes of explanation. it should be understood that the marking device of this invention can be used for the marking of cans and other cylindrical metal containers, bottle caps and aerosol cans, and other metal objects such as metal oil filters.

The cans 12 are carried on a conveyor belt 14 between the spaced members of a stationary frame 18 of the marking device 10. Each of the cans illustrated has a lower circumferential rim or chime 16. It has been found that marking by indentation of the chime can be done rapidly and effectively without damage to the container.

A marking assembly, indicated generally by reference numeral 20, is mounted on the frame 18 of marking device 10 and includes a chase holder 22 having a chase block receptacle 24 defined by the chase holder back member 26, a base member 28, and opposing upstanding side members 30 and 32. The chase holder 22 also has a depending bottom member 34 with a mounting member 36 extending laterally therefrom.

A cover plate 38 is connected by suitable fasteners to the top surfaces of chase holder side members 30 and 32 and partially covers a chase block 40 which is slidably mounted in receptacle 24 on the upper surface of base member 28. The back member 26 of chase holder 22 has extending therethrough a bore 42 through which

there extends a threaded adjustment screw **44** which is locked in position by a nut **46.** A bearing plate **48** is mounted in receptacle **24** on the end of adjustment screw **44** in abutting relationship with the rearward portion or surface of a resilient block **50.** Resilient block **50** can have any configuration that is compatible with the other structural elements of the chase holder **22** and can be constructed of any resilient material, one preferred material being urethane. Resilient block **50** is mounted between adjustment screw bearing plate **48** and the rearward surface of chase block **40** for operation in a manner described more fully below.

A stop plate **62** is integral with the front end portions of chase holder **22** and extends transversely across the lower front portion of recepticle **24.** An anvil **52** is formed by a recess in chase block **40** which provides a type chase receptacle **54** in which is mounted a type chase **56** containing a plurality of type dies **60.** Type chase **56** is fixed in position by drive screw **58** and is covered and protected by a chase cover **64** secured in position by a cap screw **66.** Chase cover **64** has an aperture **65** at the front thereof through which extend the plurality of type dies **60.**

The marker assembly adjusting assembly, indicated generally by reference numeral **68,** is mounted on frame **18** by suitable means such as bolt **69** and bore **71** and includes a tilt support **70** having a back member **72** integral with a base member **74** having a bore **76** extending therethrough and spaced from the back member **72.** A base adjusting screw **78** extends through base bore **76** and is locked in position by nut **80.**

As is shown most clearly in FIG. **2,** the chase holder **22** is mounted with its mounting member **36** substantially aligned with back member **72** of tilt support **70** and with the bottom surface of chase holder bottom member **34** resting on the threaded end of base adjusting screw **78.** Chase holder mounting member **36** has extending therethrough a lower adjusting bore **82** and an upper adjusting bore **84** in which there are threadably secured, respectively, a lower adjusting screw **86** and an upper adjusting screw **88.** Lower adjusting screw **86** is locked in position by the single lock nut **90,** and upper adjusting screw **88** is locked in position by the combination of spherical nut **94** and washer **92.**

A shim, or tilt plate **96,** is mounted between back support member **72** and chase holder mounting member **36** by suitable means such as a suitable fastener inserted through bore **98** in tilt plate **96** in alignment with bore **99** through the support back member **72.** Tilt plate **96** can have parallel sides or inclined sides and is replaceable. Tilt plate **96** is adjusted in combination with tilt support **70** and adjustment screws **78, 86** and **88** as necessary in a particular use of the device of this invention in aligning marking assembly **20,** and in particular the type dies **60,** with the marking surface of can **12** or of another object to be marked. Because of the flexibility of the adjusting assembly, and because of the adjustability of other structural elements of this device which are described below, the marking device of this invention can be used to mark the surfaces of a wide variety of metal objects both cylindrical and non-cylindrical.

The marking device **10** includes a drive assembly, indicated generally by reference numeral **100,** which includes a drive disc **102** having an axial hub **104** extending upwardly therefrom. Drive disc **102** is connected by hub **104** to a suitable motor and power transmission means (not shown in the drawings), the connection being made, for example, by connecting a drive shaft from the motor and transmission means in the hub bore **106** by mating a transmission shaft key in the key slot **108** of hub **104.**

A disc cover **110** is connected to the table **122** of marking device **10** by a plurality of cap screws **114** which extend through mounting slots **112** in disc cover **110.** Suitable structural members, not shown, connect the table **122** to the frame **18.** The mounting slots **112** are perpendicular to the line of travel of cans **12** on conveyor **14.** The elongate mounting slots **112** are parallel to an elongate hub slot **116** extending along an intermediate portion of disc cover **110.** Disc hub **104** extends upwardly through hub slot **116** and operates as a guide member for drive disc **102** during adjustment. Disc cover **110** also has a plurality of motor mount slots **118** spaced from, and parallel to, the longitudinal axis of hub slot **108.**

As can be seen in FIGS. **1** and **2,** drive disc **102** is mounted in the marking device **10** in vertical spaced relationship with the bottom surface of disc cover **110** and the upper surface of the table **122** of frame **18.** The strutural members of the drive assembly **100** are adjustable over a wide range of positions perpendicular to the line of travel of cans **12** on conveyor **14.** Cover plate **110** is adjustable over a distance determined by the length of mounting slots **112.** Drive disc **102** and the attached motor and power transmission means are adjustable, respectively, over the length of hub slot **116** and the length of motor mount slots **118,** thereby enabling the adjustment of the drive means and marking device **10** to accommodate a substantial range of metal objects regardless of their dimensions or configurations.

A ring **120** of resilient material is mounted around the circumference of drive disc **102** or engagement with the external surface of the object to be marked. Resilient ring **120** can be composed of any resilient material compatible with the other structural members and operation of the marking device **10** and can be fabricated from a urethane resin, rubber or the like. The urethane resin ring is preferred.

In operation, a can **12,** or other metal object to be marked, is set in the marking station between drive disc **102** with resilient ring **120** and the type dies **60** of marking assembly **20.** The angle between can **12** and marking device assembly **20** is adjusted by operation of adjusting assembly **68** to accommodate the dimension and configuration of the chime **16,** or other surface to be marked. Drive assembly **100,** including drive disc **102,** is adjusted to provide a force to can **12** sufficient to rotate can **12** in a direction opposite to its direction of linear travel past type dies **60** with a force sufficient to mark the chime with a plurality of legible die marks without damaging the metal surface. Because of the interaction of the resilient block **50** and the resilient ring **120,** it is possible to obtain rapid continuous marking with clearly legible die marks even with variations in diameter of the object to be marked of up to 1/32 of an inch, and more. That result is believed to follow from the shock absorbing action of the two resilient members.

Another advantage obtained from the marking device of this invention is explained with reference to FIGS. **4** and **5.** It has been found that use of the marking device of this invention including the resilient ring

120 on drive disc 102 and the resilient block 50 on the marking assembly 20 enables the placement of a mark on a metal object of from six to nine characters, or more, which field of marking is a substantial increase over the field available with devices prior to this invention.

It is believed that the increased effective marking field results from use of the resilient rim on drive disc 102, possibly in combination with the resilient block in the marking means. In FIGS. 4 and 5, there are depicted similar situations in that each device is shown as marking a plurality of cans 12 having identical diameters 124 with marking assembly 20 in identical fixed position. In FIG. 4, drive disc 102 has no flexible circumferential ring and has a diameter shown diagrammatically as the diameter 126. In FIG. 5, drive disc 102 equipped with resilient circumferential ring 120 has a larger diameter 128. As is illustrated in the drawings, with all other parameters being equal or identical, the device of this invention provides an earlier time of contact between drive disc 102 and can 12 and a longer period of contact between the drive disc and the can, thereby providing a longer period during which an effective marking force is exerted between the drive assembly and the marking assembly. It is believed, also, that the point contact of the prior art device between the drive disc and the can is replaced by an arc of contact between the urethane ring on the drive disc and the outer surface of the can, thereby providing a wider area of marking force which is stabilized and maintained by the resilient ring as well as by the resilient block in the marker assembly.

According to the provisions of the patent statutes, we have explained the principle, preferred construction and mode of operation of our invention and have illustrated and described what we now consider to represent its best embodiment. However, it should be understood that, within the scope of the appended claims, the invention may be practiced otherwise than is specifically illustrated and described.

We claim:

1. A marking device for a metal object including,
- metal marking means mounted adjacent a marking station and having type means positioned substantially coincident with a line of travel of a preselected outer surface of said metal object,
- drive means mounted on a stationary table opposite said metal marking means, said drive means including a drive disc rotatably mounted on said stationary table with said drive disc outer circumference substantially tangent to a straight line of travel defined by said preselected outer surface of said metal object between said metal marking means and said drive disc,
- said drive disc operable to engage a portion of said preselected outer surface of said metal object and move a portion of said outer surface into engagement with said type means to mark said metal object,
- a first resilient member including a ring of resilient material mounted on the circumference of said drive disc for engagement with said metal object, said ring of resilient material operable to urge said metal object into forcible engagement with said type means while partially absorbing the force applied to said metal object,
- adjusting means connected to said marking means and operable to adjust the orientation of said metal marking means and said type means relative to said preselected outer surface of said metal object,
- said adjusting means including other means to adjust the marking force exerted by said type means on said preselected outer surface of said metal object,
- a second resilient member positioned between said adjusting means and said type means, said second resilient member arranged to absorb a portion of the force exerted on said metal object during the marking operation,
- a disc cover slidably mounted on said table in spaced relation to said disc. said disc cover adjustable along a line perpendicular to the straight line of travel of said metal object,
- said disc cover having an elongated slot extending along an intermediate portion thereof, and
- a shaft extending from the center of said disc through said slot in said cover and slidable along said slot.

2. A marking device for a metal object as set forth in claim 1 in which said marking means includes,
- a type chase holder mounted on said device adjacent said metal object to be marked,
- a chase block slidably mounted in said holder for movement toward and away from said metal object to be marked,
- a type chase mounted in said chase block and extending toward said metal object to be marked,
- a plurality of type dies mounted in said type chase adjacent said metal object,
- type adjustment means mounted in said holder to urge said chase block toward said metal object to be marked and maintain a desired marking pressure, and
- said second resilient member mounted in said type chase holder between said type adjustment means and said chase block, said second resilient member arranged to absorb part of the force exerted by the interaction between said drive disc and said metal marking means on said metal object.

3. A marking device for a metal object as set forth in claim 1 in which said adjusting means includes,
- a tilt support having a back member mounted on said table and a base member extending outwardly from the lower end of said back member,
- said base member having a threaded aperture therethrough and a base adjusting screw extending through said aperture,
- said marking means having a housing with a mounting plate aligned with said tilt support back member, the bottom edge of said mounting plate spaced from said tilt support base member and in abutting relation with said base adjusting screw,
- said housing mounting plate having a pair of spaced bores extending therethrough toward said tilt support back member,
- first and second adjustable set screws each threadably secured in one of said mounting plate bores and extending therethrough, and
- a tilt plate mounted between said housing mounting plate and said tilt support back member, said first and second set screws having end portions abutting said tilt plate to adjustably maintain said marking means at a desired angle relative to said metal object.

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