United States Patent [19]

Beck

[11] 3,730,085

[45] May 1, 1973

[54] SELECTIVE DRUM PRINTER WITH PAWL MEANS TO LOCK THE TYPE WHEEL IN SELECTED POSITION

[75] Inventor: **Norman A. Beck**, Ellicott City, Md.

[73] Assignee: **Koppers Company, Inc.**, Pittsburgh, Pa.

[22] Filed: **Sept. 20, 1971**

[21] Appl. No.: **181,747**

Related U.S. Application Data

[62] Division of Ser. No. 6,201, Jan. 27, 1970, Pat. No. 3,633,498.

[52] **U.S. Cl.** **101/110**, 101/95, 101/4

[51] **Int. Cl.** **B41j 7/48**

[58] **Field of Search** ..... 101/93 C, 95, 97, 101/109, 110

[56] **References Cited**

UNITED STATES PATENTS

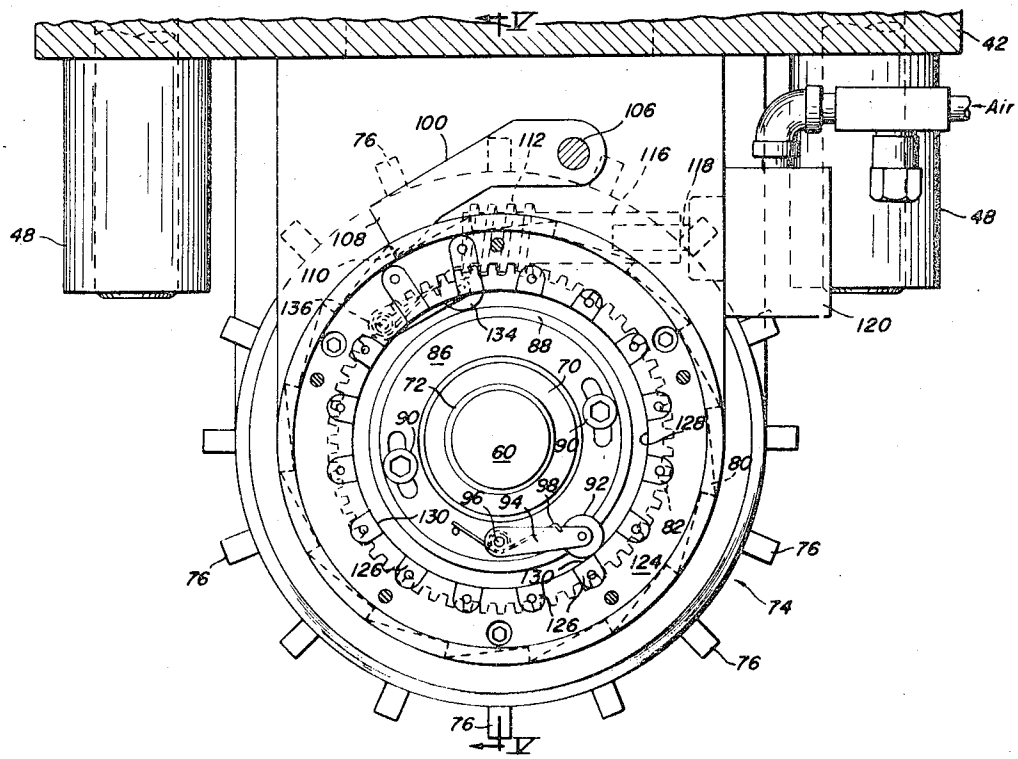
3,379,075	4/1968	Harrison	101/95 X
3,141,402	7/1964	Howard	101/110 X
3,156,181	11/1964	Dubin	101/110
1,746,516	2/1930	Boyer	101/99
2,766,687	10/1956	Williams	101/110 X
2,818,801	1/1958	Hart et al	101/110 X
923,074	5/1909	Pollock	101/110

Primary Examiner—Robert E. Pulfrey
Assistant Examiner—E. M. Coven
Attorney—Boyce C. Dent et al.

[57] **ABSTRACT**

Apparatus for marking a plate member at a preselected location and to impress selected characters on opposite sides of the mark. A bridge member spans a layout table and is movably supported on a pair of rails secured to the table sides so that the bridge member is movable longitudinally along the layout table. A turret assembly is movably supported on the bridge member and is movable longitudinally thereon and transversely relative to the layout table. The turret assembly includes a marking head assembly that is movable vertically toward and away from the plate positioned on the layout table. The marking head assembly includes a central support member with a punch member extending downwardly therefrom and a pair of marking wheels rotatably supported on opposite sides of said support member. The marking wheels have a plurality of raised characters positioned at spaced intervals along the outer periphery. The marking wheels are rotated by means of a driven worm gear assembly and a pawl ratchet assembly. A fixed commutator wheel is associated with each marking wheel and has separate commutators for each character on the marking wheel. Separate fixed and movable commutator wheels complete an electrical circuit through a remotely closed switch circuit and the commutator for a selected numeral on the marking wheel. The circuit remotely controls the drive for rotating the marking wheel and stops the wheel when the selected numeral is in a marking position.

4 Claims, 6 Drawing Figures



2 Sheets-Sheet 1

FIG. 1

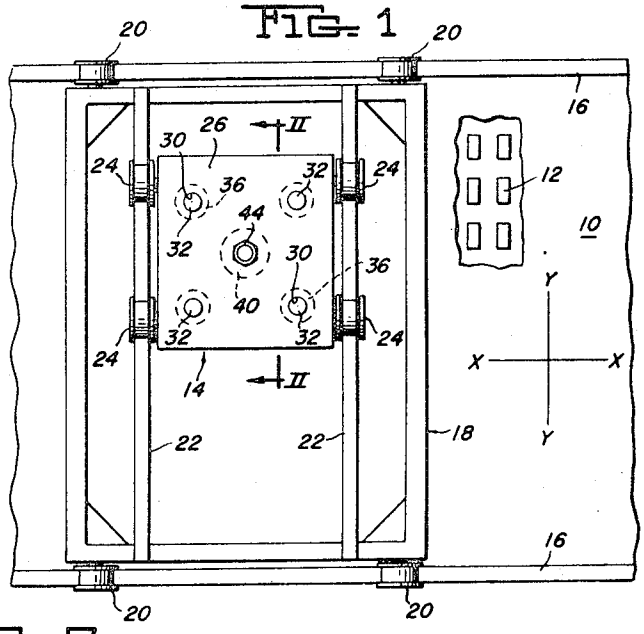


FIG. 2

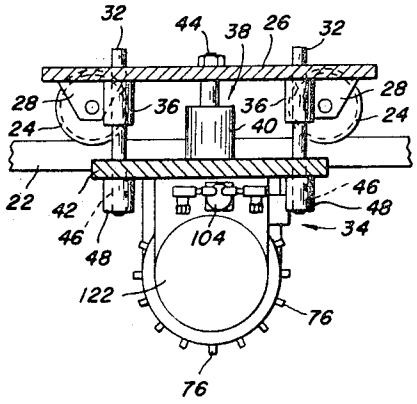


FIG. 3

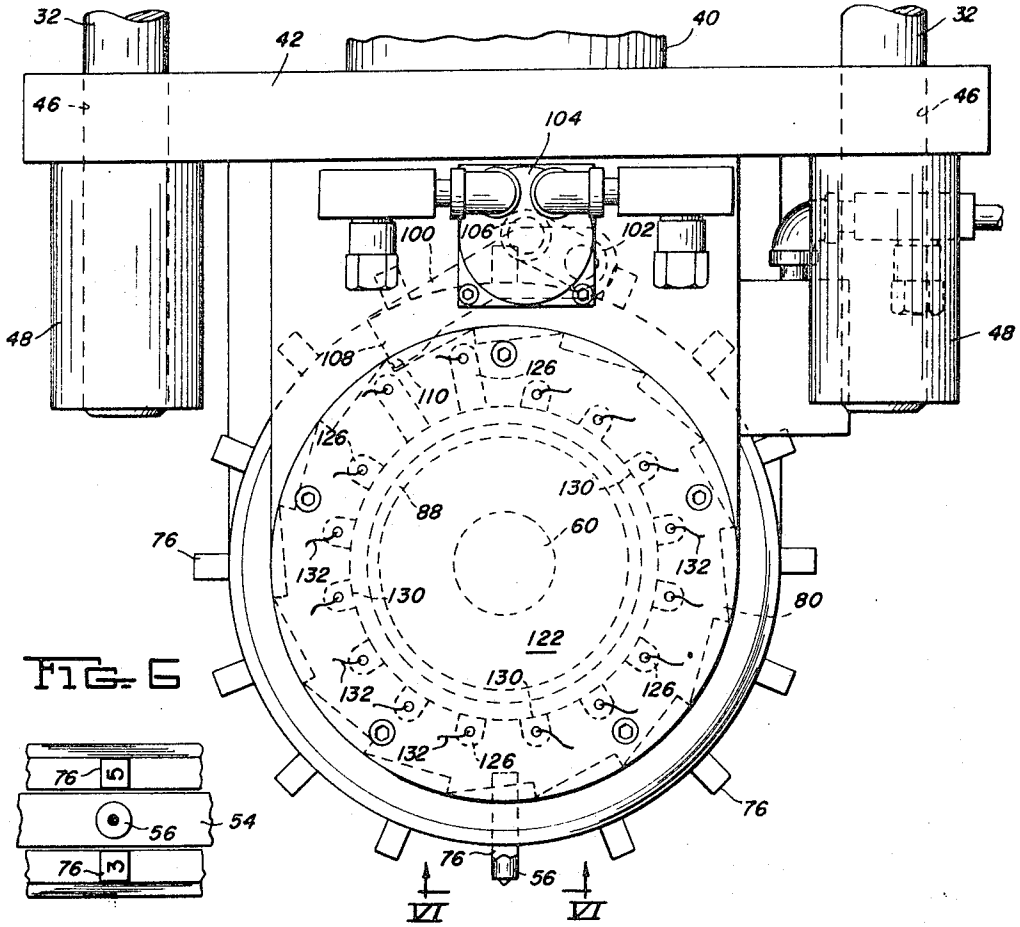


FIG. 6

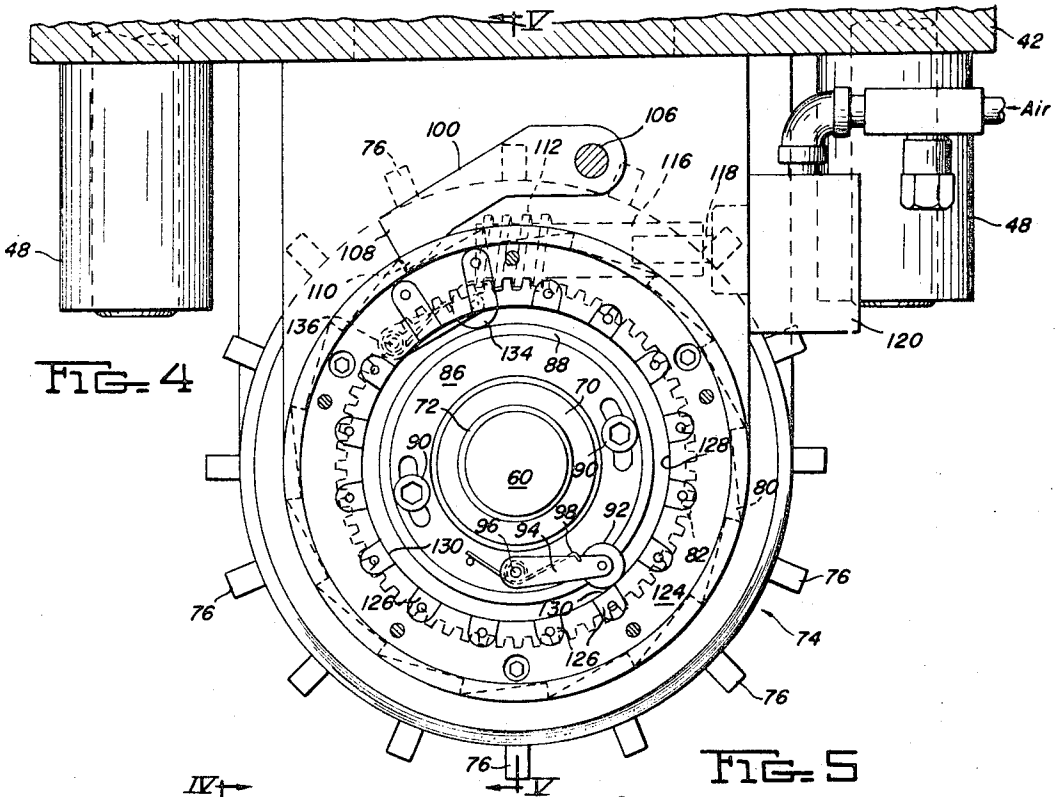
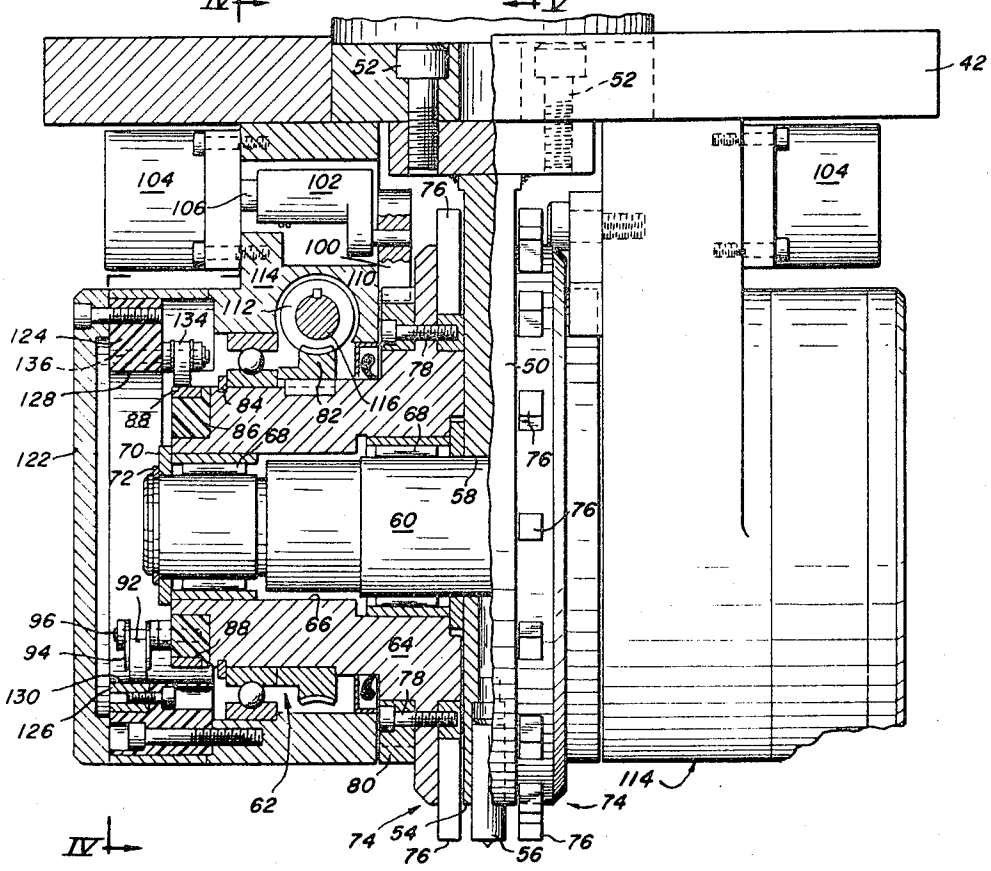

V
42
Air
48
48
100
106
76
112
116
118
108
110
136
134
88
86
70
72
90
60
90
128
80
98
92
96
94
82
130
124
126
76
74
120

FIG. 4

FIG. 5


IV
V
42
52
52
104
102
106
100
114
112
134
124
136
128
88
84
82
116
68
86
70
72
78
50
76
58
60
76
92
96
94
130
126
88
66
64
78
62
80
74
54
76
56
76
114
74
IV

SELECTIVE DRUM PRINTER WITH PAWL MEANS TO LOCK THE TYPE WHEEL IN SELECTED POSITION

This is a division of application Ser. No. 6201, filed Jan. 27, 1970 and now U.S. Pat. No. 3633498.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a remotely controlled marking device and more particularly to a marking device wherein the relative position of the marking wheel thereon is controlled by an electric circuit through the marking wheel.

2. Description of the Prior Art

Remotely controlled marking devices such as those illustrated in U.S. Pat. Nos. 2,818,014 and 3,012,688 are used to mark slabs, billets or the like. The marking heads are positioned on arms or support devices and the location of the marks impressed on the article are dependent on the location of the article relative to the marking device. Mechanical means are employed to control the positioning of the marking wheels to position the desired characters in the marking position.

Where a plurality of different operations such as drilling holes of different diameters, cutting along a given arcuate line and the like are to be performed on a plate, it is highly desirable to mark the locations on the plate where all of the desired operations are to be performed and to indicate at each location the type of operation to be performed at that specific location. In the past, marking the location on the plate where the different operations were to be performed was accomplished by a conventional punch. The type of operation to be performed at each location was either performed at the time of marking or manually indicated on the plate. Either procedure was time consuming and subject to error. There is a need for apparatus to remotely mark the locations where a given operation is to be performed and to also remotely indicate by a numerical code the type of operation to be performed at that location.

SUMMARY OF THE INVENTION

The hereinafter described invention is directed to a turret assembly that is accurately positioned in overlying relation to a desired location on a plate. A plurality of marking wheels on the marking head of the turret assembly are remotely rotated and are arranged to stop with a preselected character in marking position on opposite sides of a punch on the marking head. The marking head is moved downwardly into abutting relation with the plate and impresses both a punch mark and characters adjacent the punch mark to indicate the type of operation to be performed at that location. The marking head has a drive means to rotate the marking wheels and an electrical control device is provided to stop the drive means when the selected character is in marking position.

Accordingly, the principal object of this invention is to provide a remotely controlled marking device that both marks a plate and impresses remotely selected characters at a location adjacent the mark.

Another object of this invention is to provide a remotely controlled electrical device in the marking heads to stop the marking wheel when the preselected character is in marking position.

These and other objects and advantages of this invention will be more completely disclosed and described in the following specification, the accompanying drawings and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary top plan view of the layout table with the turret assembly movably positioned thereon.

FIG. 2 is a fragmentary view in section taken along the lines II—II of FIG. 1 illustrating the manner in which the turret assembly is supported on the transverse rails.

FIG. 3 is an enlarged view in front elevation of the turret assembly.

FIG. 4 is a view in section and in front elevation taken along the lines IV—IV in FIG. 5.

FIG. 5 is a view in side elevation and partially in section of the marking head portion of the turret assembly taken along the line V—V of FIG. 4.

FIG. 6 is a fragmentary view in plan of the underside of the turret assembly illustrating the marking wheels on opposite sides of the punch member taken along the lines VI—VI of FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings and particularly FIGS. 1 and 2, there is illustrated a layout table generally designated by the numeral 10 that includes a plurality of electromagnets 12 in the base of the table 10. The electromagnets are arranged to magnetically engage and secure a metallic work plate to the upper surface of the table 10 in a preselected position and maintain the work plate in that position while the turret assembly generally designated by the numeral 14 is moved to various preselected positions above the work plate. At these positions the turret is arranged to both punch and mark the work plate.

The table 10 has a pair of parallel rails 16 extending longitudinally along the sides of the table with a bridge member 18 movably supported on the rails 16 by wheels 20. A propelling means (not shown) is arranged to move the bridge member 18 on the rails 16 longitudinally along the table 10 to various locations above the work plate secured to the base or bed of the table 10. The bridge 18 has a pair of rails 22 extending transversely to the table 10 with the turret assembly 14 movably supported on rails 22 by wheels 24. Suitable propelling means is provided to move the turret assembly 14 along the rails 22 to position the turret assembly 14 at preselected transverse locations above the work plate secured to the table 10.

With this arrangement, longitudinal movement of the bridge 18 positions the turret 14 at preselected X locations on the work plate. The transverse movement of the turret 14 relative to the table 10 and the work plate positioned thereon is accomplished by the movement of the turret 14 along the rails 22 to thus position the turret assembly 14 at preselected Y locations above the work plate. The positioning of the turret 14 above the work plate at preselected X and Y locations may be accomplished by manual control or may be controlled by tapes, cards or other automated programmed control devices.

A feed-back system is provided for a visual indication of the exact X and Y location of the turret assembly. Any suitable feed-back system may be employed, such as the Emmerson Electric Accra-Count position indicator used for machine tools. Such a feed-back system includes a spur toothed rack mounted along one of the rails **16** with a spur gear rotatably mounted on the bridge member **18** in meshing relation with the spur toothed rack. The rotation of the gear drives a pulse generator which electrically drives a read-out counter at a remote control station. The counter may be designed to read in inches or other suitable dimension indicating digits. A similar arrangement may be used to visually indicate the position of the turret member **14** on the bridge **18**.

With this arrangement, an operator can rapidly position the turret at a preselected X and Y location on the table **10** above the work plate secured to the table **10**. At the preselected location as will be later described, the operator through suitable electric controls, rotates the marking wheels on the turret **14** to position preselected numbers on the wheels in marking position. By other controls a portion of the turret is moved downwardly and impresses a punch mark at the preselected location by means of a punch and also imprints characters on opposite sides of the punch mark. The characters on opposite sides of the punch mark may be used to indicate the type of metal finishing operation to be performed at that specific location on the plate.

The turret assembly **14** includes an upper plate **26** that is maintained at a fixed elevation above the table and has depending flange portions **28** to which the wheels **24** are rotatably secured. The plate **26** has four spaced post apertures **30** with posts **32** of the marking head assembly **34** extending therethrough.

As illustrated in FIG. **2**, depending guide sleeve members **36** are secured to the underside of the plate **26** to rigidify the assembly and provide elongated passageways through which the posts **32** extend. A piston cylinder assembly **38** has a cylinder **40** secured to a horizontal marking head mounting plate **42** of the marking head assembly **34** and the end portion of a piston rod **44** is secured to the fixed plate **26**. The posts **32** extend through apertures **46** in the marking head mounting plate **42** and are secured to the underside of the plate **42**. With this arrangement, the posts **32** secured to the mounting plate **42** extend through the guide sleeves **36** and the apertures **30** in the upper turret plate **26** and provide for guided vertical movement of the marking head assembly **34**. The piston cylinder assembly **38** secured at one end to the marking head mounting plate **42** and at the other end to the turret mounting plate **26** is arranged to extend and retract the piston rod **44** within the cylinder **40** and thus move the marking head assembly **34** vertically. The piston cylinder head assembly **38** is preferably an air cylinder, although other servomechanisms may be used. An auxiliary cylinder may be provided (not shown) to exert added force on the marking head assembly **34** to drive and impress the punch mark and the code numbers in the work plate. Where desired, the piston cylinder assembly **38** may be employed to both lower the marking head assembly and to also apply sufficient force to the punch and marking wheels to impress the punch mark and characters into the surface of the work plate.

The marking head assembly generally designated by the numeral **34** is illustrated in detail in FIGS. **3, 4** and **5** and includes a horizontal plate support member **42** with a depending central vertical support member **50** secured thereto by means of bolt members **52**. The vertical support **50** has an arcuate lower end portion **54** with a punch member **56** secured therein. The punch member is arranged upon lowering of the marking head assembly **34** to impress a punch mark in the plate member secured to the upper surface of table **10**.

The vertical support **50** has a transverse passageway **58** therethrough through which extends a support shaft **60**. The shaft **60** is arranged to support a pair of rotatable marking wheels generally designated by the numeral **62** on opposite sides of the vertical support member **50**. The marking wheels **62** are similar in construction and have a body portion **64** with a transverse passageway **66** therethrough. The support shaft **60** extends through the passageway **66** and rotatably supports the marking wheel **62** thereon. Bearings **68** are positioned between the shaft **60** and the wheel body portion **64** and the marking wheel **62** is maintained on the shaft **60** by means of an annular washer **70** and snap ring **72**. With this arrangement, the marking wheel **62** is freely rotatable about the shaft **60**.

An annular character wheel **74** having spaced radially extending blocks **76** along the periphery thereof is secured to the marking wheel **62** by means of bolts **78**. The radially extending blocks **76** have raised characters along the ends that form corresponding impressions in the plate. The marking wheel body portion has an annular ratchet wheel **80** secured thereto by the same bolts **78**. An annular worm wheel **82** is secured to the marking wheel body portion **64** by a snap ring **84**. With this arrangement, the number wheel **74**, ratchet wheel **80** and worm wheel **82** are secured to and rotate with the ratchet wheel body portion **64**. The marking wheel **62** has an annular end ring member **86** with a conductor ring **88** therein secured to the outer end of the wheel body portion by bolts **90** (FIG. **4**) so that the rings **86** and **88** rotate with the marking wheel.

A contactor wheel **92** is rotatably supported on an arm member **94** that is pivotally secured on pin **96** extending from ring **86**. The arm member **94** and pin member are arranged to provide a current path from wheel **92** to conductor ring **88**. A spring member **98** urges the contactor wheel **92** in a clockwise direction as viewed in FIG. **4**.

A pawl **100** is pivotally supported at one end by a bell crank lever **102**. A pawl drive motor **104** is suitably secured to the horizontal support plate **42** and has a shaft **106** connected to lever **102**. With this arrangement, rotation of the pawl drive motor shaft **106** rotates the pawl **100** to move the pawl end portion **108** toward and away from the ratchet wheel teeth **110** so that when the pawl member is in the position illustrated in FIGS. **3** and **4**, the marking wheel **62** is nonrotatably fixed relative to the shaft **60** and maintains the preselected character in a locked marking position.

A worm gear **112** is suitably supported in a housing **114** which is, in turn, supported on the horizontal plate members **42**. The worm gear **112** meshes with the worm gear **82** secured to the marking wheel body portion **64** so that rotation of the marking wheel **62** is dependent on the rotation of the worm gear **112**. The worm gear **112** is secured to a shaft **116** that is, in turn,

secured to the drive shaft 118 of an air motor 120. With this arrangement, actuation of air motor 120 rotates the worm 112 which, because of its meshing relation with the worm gear 82, rotates the marking wheel 62.

An end enclosure or cover 122 is secured to the housing 114 and remains in fixed nonrotatable relation relative to the marking wheel 62. Positioned within the enclosure 122 is an annular fixed commutator ring 124 that has a plurality of commutators 126 formed therein. A separate commutator 126 is provided on the fixed commutator wheel 124 for each character on the marking wheel 62. A conductor wire is connected to each commutator 126 and the conductors are gathered into a single conduit that extends to a remote operator's console where each conductor wire forms a separate circuit with a separate switch. The circuits are arranged to stop the air motor 120 and also to energize and deenergize the pawl drive motor 104.

The commutator ring 124 has an inner cylindrical surface 128 and the commutators 126 each have a surface 130 that forms a part of the inner cylindrical surface 128 of commutator ring 124. There are positioned around the commutator ring 124 the same number of commutators 126 as there are characters 76 on the marking wheel 64. The commutator ring 124 with the commutators 126 thereon remains fixed and does not rotate with the marking wheel 62.

The contactor wheel 92 secured to the ring 86 of marking wheel body portion 64 rotates with the marking wheel 62 and rides along the inner cylindrical surface 128 of the commutator ring 124 into conducting relation with the respective commutators 126 depending upon the relative position of the marking wheel. The contactor wheel 92 rotates with the marking wheel 62. For example, viewing FIG. 4, clockwise rotation of the marking wheel 62 would move the contactor wheel 92 in a clockwise direction therewith so that a current path or circuit between the respective contactor and the contactor wheel 92 would be completed depending upon the relative position of the contactor wheel 92 on the fixed commutator ring 124. The relative position of the contactor wheel 92 is dependent on the relative position of the marking wheel 62 on shaft 60 which in turn determines the marking character 76 in the marking position. As illustrated in FIG. 3, separate conductors 132 are connected to each contactor and extend outwardly through the enclosure 122 to a remote control panel (not shown). Thus each of the contactors forms a part of a separate circuit with a remotely located separate switch. To complete the circuit through the contactor, the remotely located switch in that circuit must be closed.

A second contactor wheel 134 is rotatably supported on a shaft 136 that is secured to the commutator ring 124. A conductor suitably connects the shaft 136 with a source of current so that current will be conducted through shaft 136 to the second contactor wheel 134. A current path is provided from wheel 134 through conductor ring 88 and to the wheel 92. When the switch between the source of current and a particular commutator 126 is closed, the circuit is completed when the wheel 92 is in contact with the particular commutator surface 130. With this arrangement, the selection of a particular character to be in marking position is made at the remote location and the switch is closed. When the wheel 92 secured to the contactor 62 rotates to a position where it is in contact with the particular commutator 126 for the particular character, the circuit is completed. With this arrangement, the completed circuit is utilized to engage or disengage the pawl 100 to the ratchet wheel 80 or to deenergize rotation of the worm gear 112.

OPERATION

The previously described apparatus for marking a plate member at a preselected location and to impress preselected characters on the plate at the preselected location operates in the following manner. The plate is positioned and oriented on the layout table 10 and is secured thereto by means of electromagnets 12. The turret assembly 14 is moved longitudinally along the layout table 10 on rails 16 to a preselected X location as controlled by the feed-back system. The turret assembly 14 is then moved transversely along the bridge member 18 to position the marking head assembly 34 in a preselected Y location.

The character on each of the marking wheels 62 is selected in the following manner. The air motor 120 is energized to rotate the worm gear 112 to thus rotate the worm wheel 82 on the marking wheel 62 so that the characters 76 on the marking wheel rotate about the shaft 60. The air motor 120 and pawl drive motor 104 are suitably controlled by an electric circuit that includes a separate circuit for each of the commutators 126. At the remote control station separate switches are provided for each of the numbers on the periphery of the marking wheel. A character is selected by closing the switch at the control station that is in the circuit with the commutator 126 that relates to the selected character so that a current path is provided from the selected commutator. The air motor continues to rotate the marking wheel 62 by rotation of the worm gear 112 until the commutator wheel 92 is in overlying relation with the arcuate surface 30 of the activated commutator 126. The circuit through the closed switch is then completed through the commutator wheel 136, conductor ring 86, commutator wheel 92 and activated commutator 126. The completion of the circuit actuates a suitable device such as a solenoid and deenergizes the air motor 120. The marking wheel 62 is then positioned with the preselected numeral or character in marking position. The pawl member moves into overlying relation with a tooth of the ratchet wheel and locks the marking wheel in position. The air drive means is then actuated for the piston cylinder assembly 38 to thus move the marking head assembly downwardly so that the punch 56 impresses a punch mark in the plate and the marking wheels impress the preselected numerals or characters on opposite sides of the punch. With this arrangement, it is possible to first accurately locate a predetermined position on a plate and to remotely select independent characters or numbers on marking wheels positioned on opposite sides of the punch and to thereafter impress the preselected characters on the plate on opposite sides of the punch mark.

According to the provisions of the patent statutes, the principle, preferred construction and mode of operation of the invention have been explained and its best embodiments have been illustrated and described.

However, it should be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A marking device comprising,

a support member,

a marking wheel having a plurality of characters arranged in spaced relation to each other around the outer periphery, said marking wheel rotatably mounted on said support member,

said marking wheel having a peripheral gear portion extending around the circumference thereof,

a drive gear meshing with said gear portion and operable upon rotation to rotate said marking wheel,

drive means connected to said drive gear and operable to rotate said drive gear,

said marking wheel having a peripheral ratchet portion extending around the circumference thereof,

a pawl member pivotally secured to said support member and movable into engagement with said ratchet portion for locking said marking wheel in a fixed position on said support member following rotation of said marking wheel to a preselected marking position,

second drive means for moving said pawl member into and out of engagement with said ratchet portion, and

control means for consecutively:

actuating said drive means until said marking wheel reaches a preselected marking position; and for

actuating said second drive means until said pawl member is in locking engagement with said ratchet portion.

2. A marking device as set forth in claim 1 in which said control means include,

a plurality of fixed contactors positioned on said support member in nonrotatable relation to said marking wheel, and

a movable contactor secured to said marking wheel and rotatable therewith,

said movable contactor operable upon rotation to abut said fixed contactors and provide a current path therebetween.

3. A marking device as set forth in claim 2 which includes,

a conductor ring on said marking wheel periphery,

a fixed conductor secured to said support member and positioned in current conducting relation with said conductor ring, said movable contactor connected to said conductor ring to provide a current path from said fixed conductor through said conductor ring to said movable contactor.

4. A marking device as set forth in claim 3 which includes,

a housing member fixedly secured to said support member and forming a part thereof, said housing member having an annular surface positioned coaxially with said marking wheel,

said fixed contactors embedded in said annular surface in spaced relation therearound, each contactor having an arcuate surface portion forming a portion of said annular surface,

said movable contactor comprising an arm member pivotally connected at one end to said marking wheel and having a wheel member rotatably secured to the other end, and

resilient means urging said contactor wheel member into abutting relation with said annular surface so that said movable contactor upon rotation of said marking wheel sequentially moves into conducting relation with said fixed contactors.

* * * * *