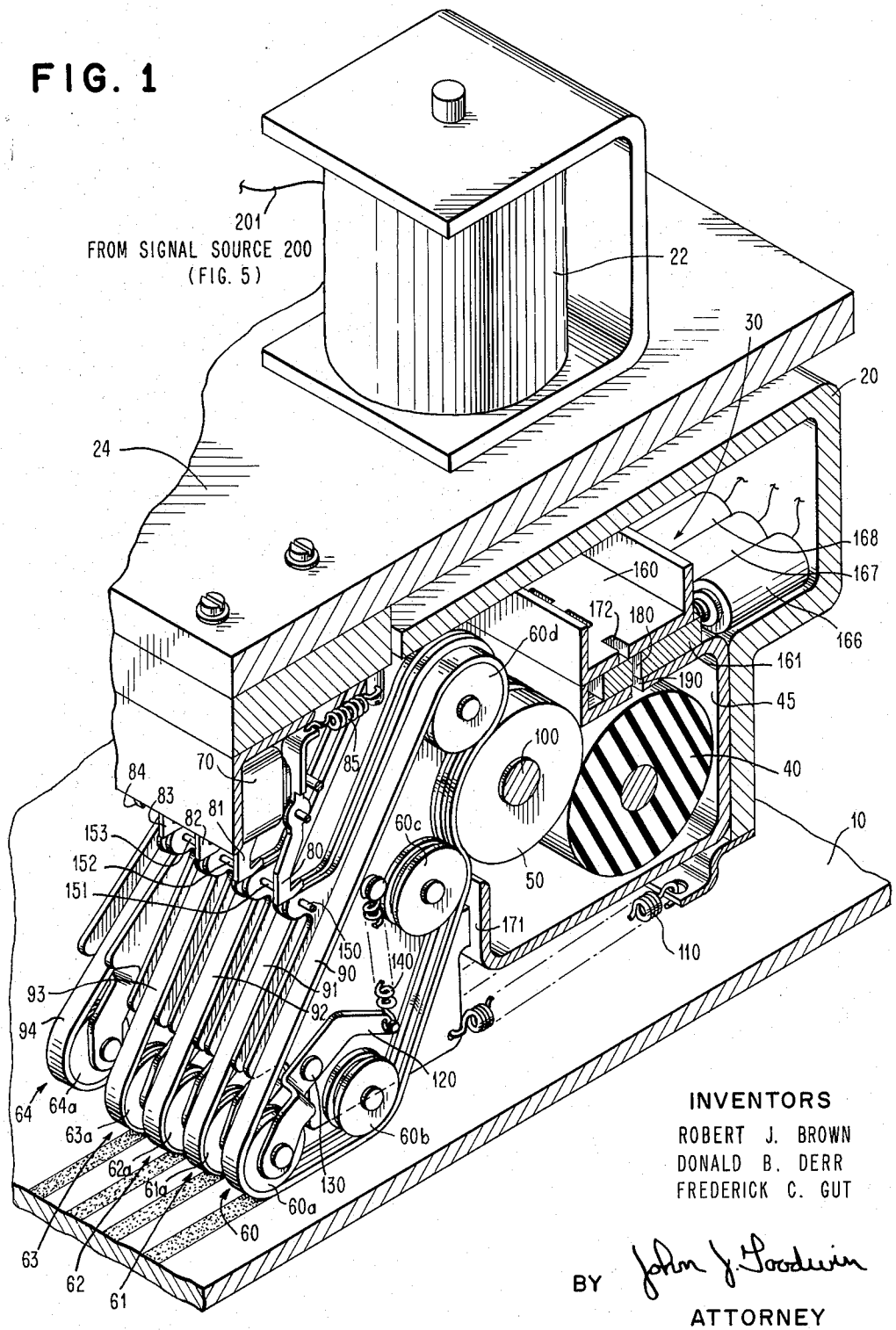
April 5, 1966 R. J. BROWN ETAL 3,244,139

MARKING APPARATUS

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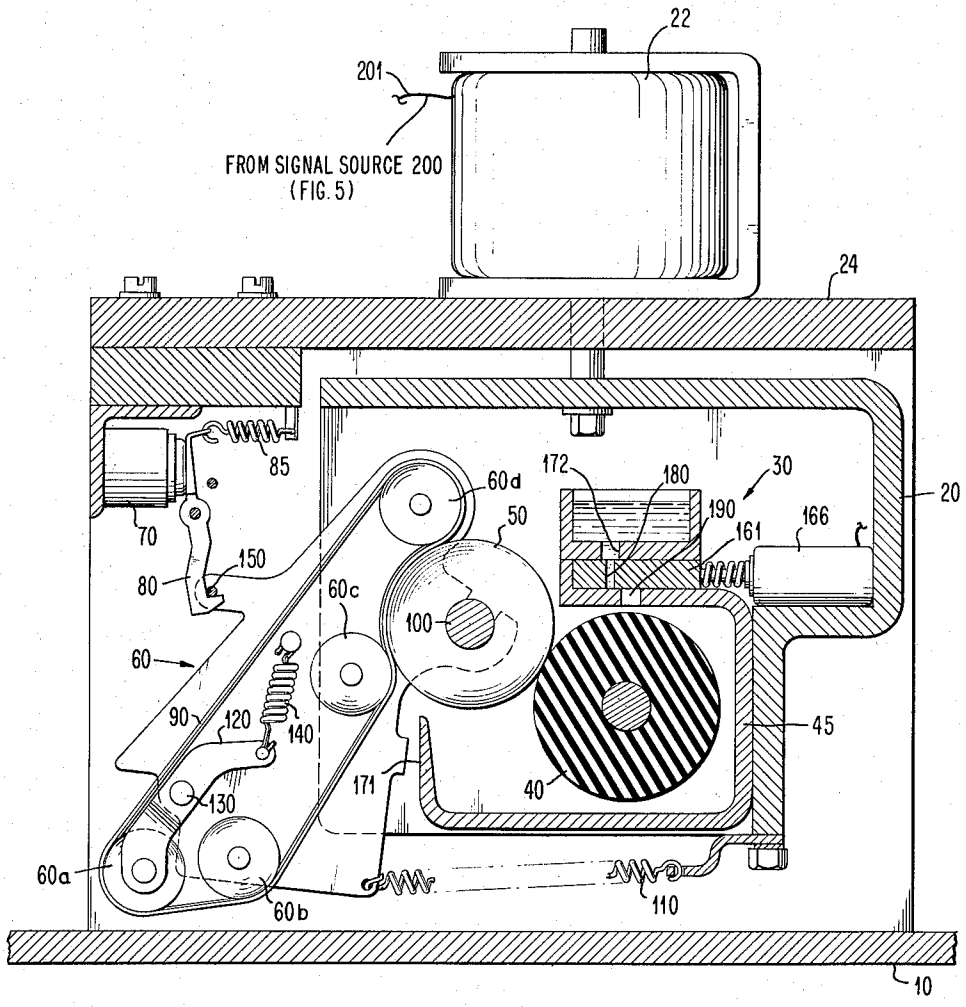
FIG. 1



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FIG. 2


22
201
FROM SIGNAL SOURCE 200
(FIG. 5)
24
85
70
80
150
60
90
120
140
130
60a
60b
60c
60d
50
100
171
172
180
190
161
166
30
20
45
40
110
10

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FIG. 3

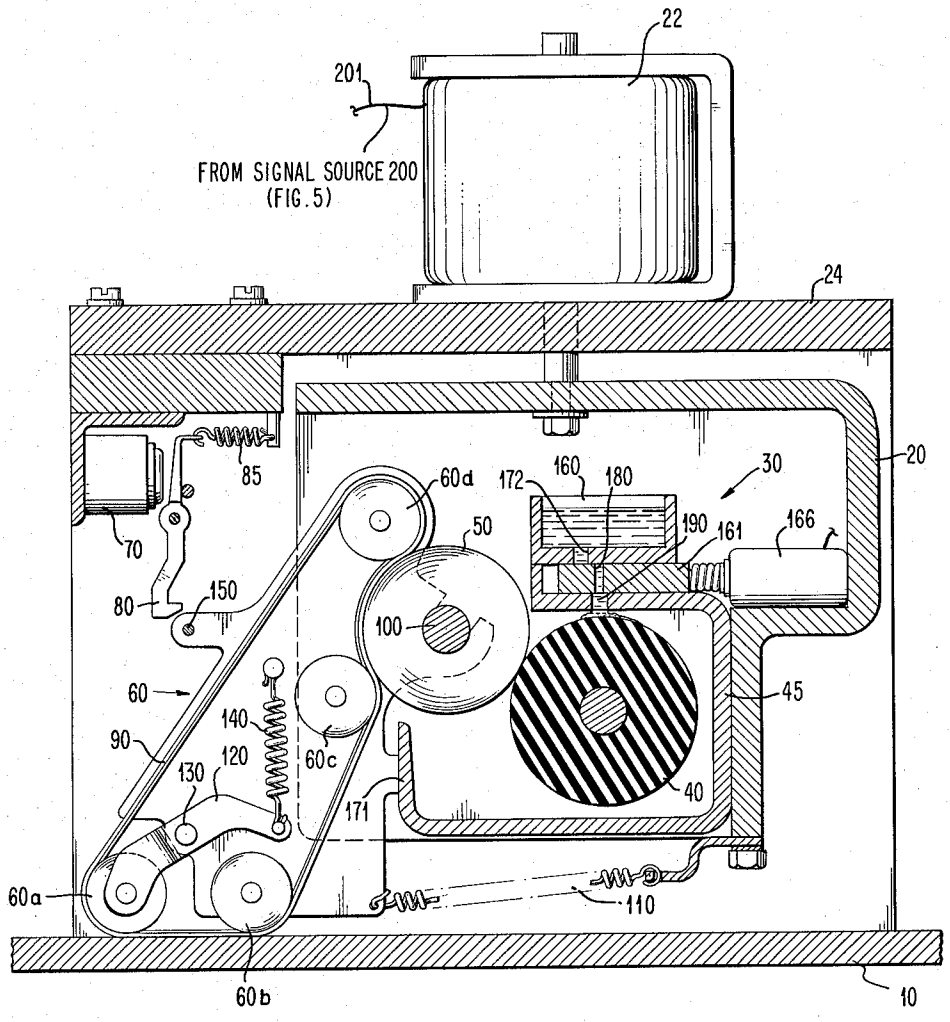
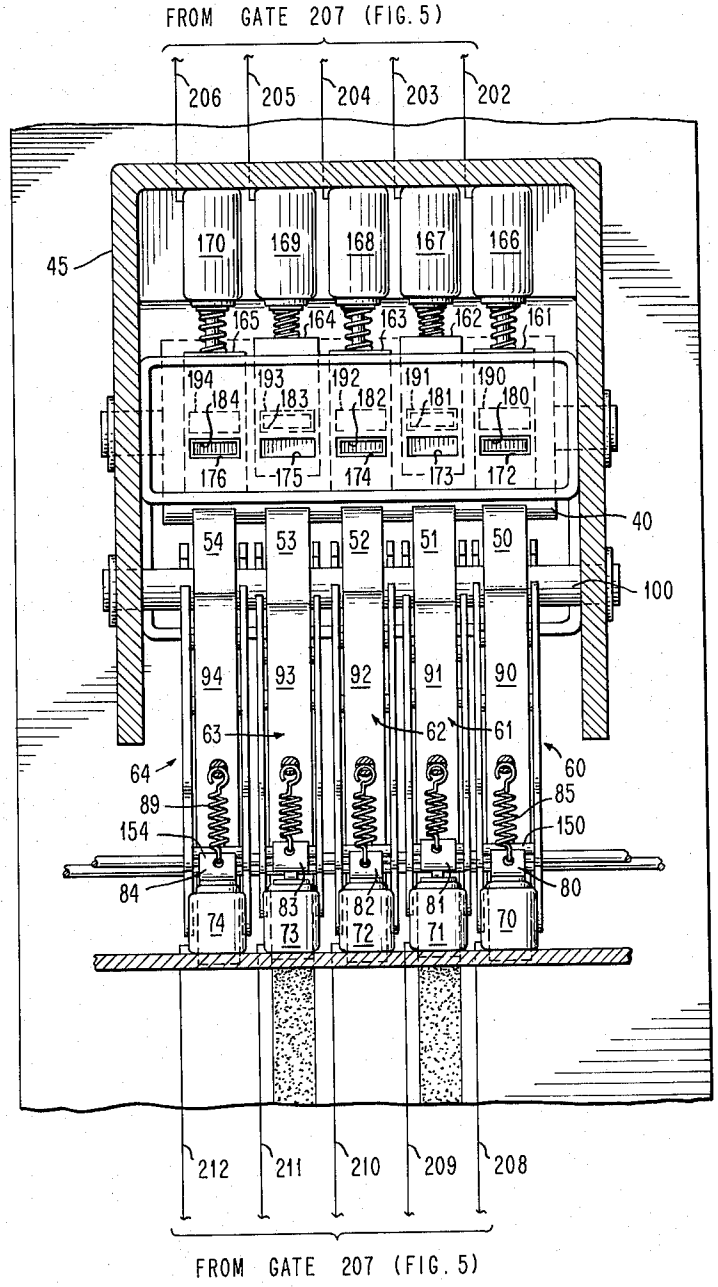


FIG. 4


FROM GATE 207 (FIG. 5)
206
205
204
203
202
45
170
169
168
167
166
165
164
163
162
161
194
193
192
191
190
184
183
182
181
180
176
175
174
173
172
40
100
54
53
52
51
50
94
93
92
91
90
63
62
61
64
60
89
85
154
150
84
80
74
83
73
82
72
81
71
70
212
211
210
209
208
FROM GATE 207 (FIG. 5)

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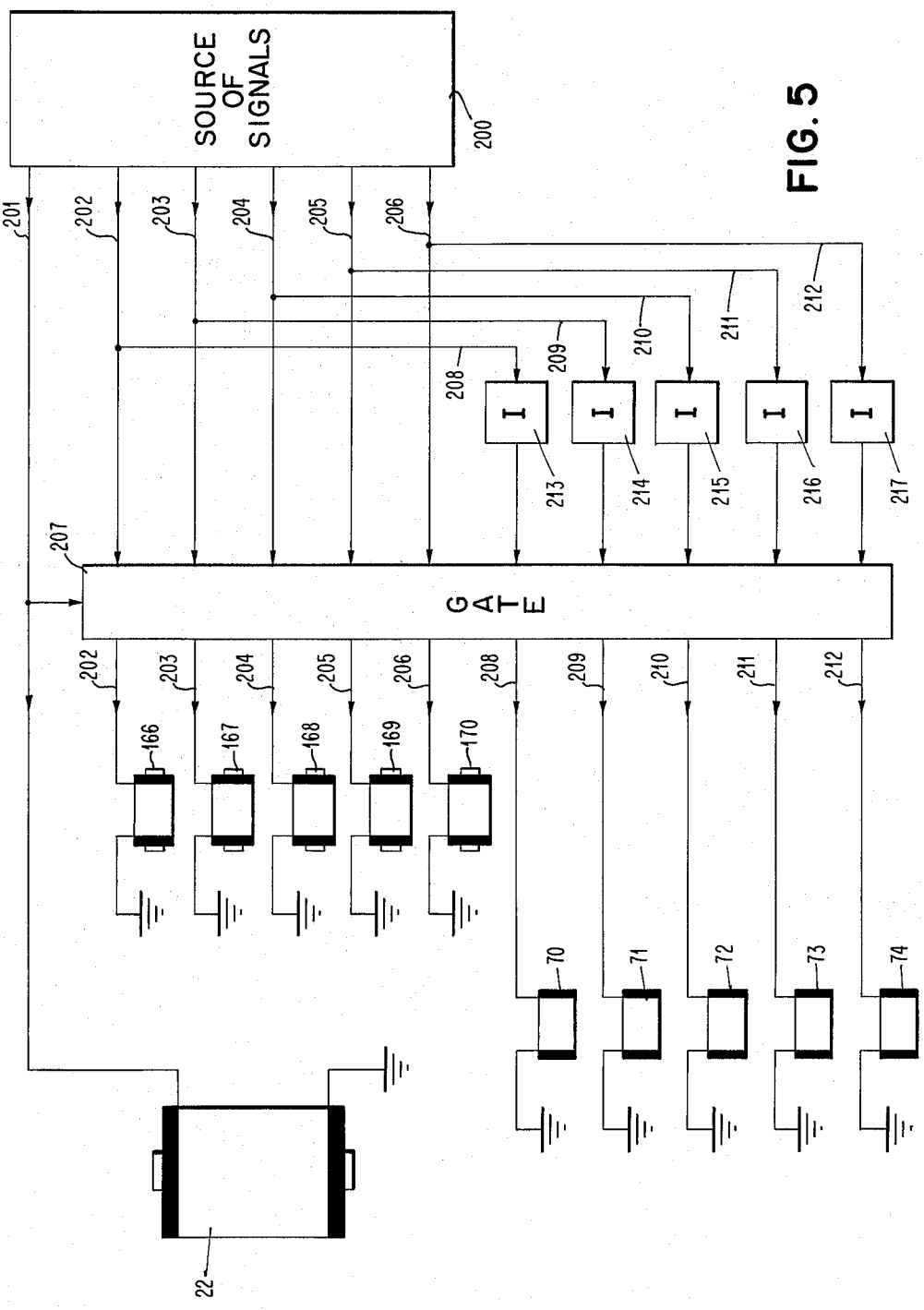


FIG. 5

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3,244,139

MARKING APPARATUS

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Filed Sept. 27, 1963, Ser. No. 312,164
5 Claims. (Cl. 118—11)

The present invention relates to apparatus for marking articles and more particularly to apparatus for applying indicia to material while the material is in motion.

The need for applying distinctive marks to manufactured items and materials is well recognized. Such marks may be for purposes of identification, or for the purpose of grading, as is common in the stamping of particular grades of lumber. Another example is the steel industry where steel or other metals are marked during different stages of processing so that the contents of a particular ingot may be identified through to the finished stock.

Customarily, it is desired to mark products which present moving surfaces such as sheet metal, steel beams, board lumber and the like. An efficient method of marking such products is by coded stripes, that is, the presence or absence of given ones of a plurality of parallel marks. Marks of this type may be made by given ones of a plurality of a parallel marking device being brought into contact with the moving surfaces to be marked. The presence and absence of given ones of the marking devices brought into contact with the moving surface results in the presence and absence of parallel marks on the surface which may be later optically read by scanning the surface in a direction transverse to the direction of the parallel markings.

A serious drawback in systems of this type is that the surface to be marked may contain high spots and low spots, and it is possible that the low spots may not become marked. Also, the surface being in motion, the marking device may bounce and leave portions of the surface unmarked when actual marking is desired. When the surface is optically scanned, the absence of a marked portion due to a low spot or bounce will be incorrectly determined as an absence of a stripe, and an incorrect identification will result.

It is, therefore, an object of the present invention to provide an apparatus for marking surfaces, particularly surfaces which move relative to the marking apparatus.

Another object of the present invention is to provide an apparatus for marking surfaces which avoids incorrect marking due to irregularities in the marked surface or the motion of the surface relative to the marking apparatus.

A further object of the present invention is to provide an apparatus for marking surfaces as described hereinabove which includes means for applying a predetermined amount of marking indicia to the surface to be marked.

Still another object of the present invention is to provide an apparatus for applying code marks directly to a given surface, avoiding separate marking elements such as tags, and wherein the marking is in the form of coded indicia produced by separate marking elements.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawings.

In the drawings:

FIG. 1 is a simplified perspective view of an embodiment of a marking apparatus following the principles of the present invention.

FIG. 2 is a cross-sectional, side elevation view of the marking apparatus of FIG. 1 showing a latched position.

FIG. 3 is a cross-sectional, side elevation view of the marking apparatus of FIG. 1 when the apparatus is in a print position.

FIG. 4 is a detailed plan view of an ink reservoir and associated controls and valves which are employed in the embodiment of FIG. 1

FIG. 5 is a schematic diagram of a control system for controlling the operation of the system of FIG. 1.

Referring to FIG. 1, a perspective drawing of a marking device for marking the surface of a customarily moving material **10** is shown including a support member **20** connected to the plunger of a solenoid **22** which is positioned above the surface of material **10**. Support member **20** is lowered toward material **10** by means of solenoid **22** mounted on a stationary member **24**. When solenoid **22** is energized, the entire support member **20** is directed down toward material **10** and when solenoid **22** is de-energized, an internal spring returns the plunger and support member **20** is raised. Solenoid **22** is only representative of many devices which may be employed for raising and lowering support member **20**, for example, hydraulic pistons, rack and pinions, and other known mechanisms are suitable. Mounted on support member **20** is an ink supply means **30**, a first ink transfer roller **40** contained in an ink roller housing **45**, a plurality of second individual ink transfer rollers **50** through **54** of which roller **50** is shown, a plurality of belt housing assemblies **60**, **61**, **62**, **63** and **64** adjacent to separate ones of the second ink transfer rollers **50** through **54** such as belt housing assembly **60** is adjacent to roller **50**. Each belt housing assembly **60** through **64** consists of two parallel members or plates having a plurality of pulley wheels and a belt (to be later described) mounted therebetween. For clarity, the right plate of belt housing assembly **60** is not shown in FIG. 1 so the internal details of the assembly may be illustrated. For explanation, five belt housing assemblies and associated equipment are described, however it is to be understood that more or less than five belt housing assemblies may be employed.

A plurality of control electromagnets **70**, **71**, **72**, **73** and **74** are mounted in a bank on stationary member **24**, only electromagnet **70** being shown in FIG. 1. A plurality of interposer members **80**, **81**, **82**, **83** and **84** are separately suspended adjacent to respective ones of electromagnets **70** through **74**. When any one of electromagnets **70** through **74** are not energized, the associated ones of interposed members **80** through **84** suspend vertically and will not engage associated ones of belt housing assemblies **60** through **64**. When any one of electromagnets **70** through **74** are energized, the upper end of the associated interposer members **80** through **84** will be attracted to the electromagnets and the other ends of the interposer members will be directed toward the associated ones of belt housing assemblies **60** through **64**. The lower ends of interposer members **80** through **84** are hooked and will engage the belt housing assemblies **60** through **64** when solenoid **22** causes the support member **20** to be directed downward provided the associated electromagnets **70** through **74** are energized. When electromagnets **70** through **74** are de-energized, springs **85** through **89** (spring **85** being shown) will return interposer members **80** through **84** to their vertical position. Each belt housing assembly includes a plurality of pulley wheels. Belt housing assembly **60**, for example, includes pulley wheels **60***a*, **60***b*, **60***c* and **60***d*. Each of the other belt housing assemblies **61** through **64** includes a similar arrangement of pulley wheels with only pulley wheels **61***a*, **62***a*, **63***a* and **64***a* being visible in FIG. 1. A belt is mounted about the pulley wheels of each of the belt

housing assemblies; belt 90 being mounted about pulley wheels 60*a* through 60*d*, and belts 91, 92, 93 and 94 mounted in like manner about the pulley wheels associated with belt housing assemblies 61, 62, 63 and 64, respectively. Belt 90 bears against individual ink transfer roller 50 which is keyed to freely rotatable shaft 100. Shaft 100 includes other individual ink transfer rollers 51 through 54 identical to roller 50 positioned so as to bear against each of the other belts 91, 92, 93 and 94.

Each of the belt housing assemblies 60 through 64 is mounted on and is free to rotate about shaft 100. A separate spring is connected between each belt housing assembly and support member 20. Spring 110 is shown connected between belt housing assembly 60 and support member 20, and each of the other belt housing assemblies has an associated spring similarly mounted. Each spring, such as spring 110, maintains the associated belt housing assembly in its furthermost counterclockwise position against a stop member 171 which is a part of an ink roller housing 45. If each belt housing assembly were to be rotated clockwise about shaft 100, the restraining tension on each associated spring such as spring 110 would increase.

Each of the pulley wheels 60*b* thronugh 60*d*, 61*b* through 61*d*, 62*b* through 62*d*, 63*b* through 63*d* and 64*b* through 64*d* are rotatably mounted directly within belt housing assemblies 60 through 64, respectively. Pulley wheels 60*a* through 64*a* are mounted within belt housing assemblies 60 through 64, respectively, by means of pivot arms such as pivot arm 120. Pivot arm 120 is free to rotate about pivot point 130, however spring 140 connected between pivot arm 120 and belt housing assembly 60 maintains pivot arm 120 in its furthermost counterclockwise position. If pulley wheel 60*a* were to be rotated clockwise about pivot point 130, the restraining tension on spring 140 would increase. The same is true of pulley wheels 61*a*, 62*a*, 63*a* and 64*a*.

Connected between the parallel plates constituting each belt housing assembly 60 through 64 are interposer bars 150 through 154 (interposer bar 154 not being visible in FIG. 1). Each of the interposed bars 150 through 154 are located such that when each of the electromagnets 70 through 74 are respectively energized, each of the interposers 80 through 84 will respectively latch interposer bars 150 through 154 as the belt housing assemblies are lowered.

As previously stated, solenoid 22 normally maintains support member 20, including belt housing assemblies 60 through 64, above the surface of material 10. When solenoid 22 is energized by a suitable print signal, the entire support member 20 and belt housing assemblies 60 through 64 are lowered such that pulley wheels 60*a* and 60*b*, 61*a* and 61*b*, 62*a* and 62*b*, 63*a* and 63*b* and 64*a* and 64*b* and the associated portions of belts 90, 91, 92, 93 and 94 therebetween tend to be brought into contact with material 10. If, however, prior to support member 20 being lowered, any of the electromagnets 70 through 74 are energized, the lower ends of the associated ones of interposers 80 through 84 will be directed toward and will engage the associated ones of the horizontal interposer bars 150 through 154. With any of the horizontal bars 150 through 154 so engaged by an interposer, when support member 20 is lowered, the associated one of belt housing assemblies 60 through 64 will be prevented from being lowered and will be rotated about shaft 100 instead.

In FIG. 1, the marking apparatus is shown in print position, support member 20 is shown lowered, with belt housing assemblies 60 through 63 in position such that belts 90 through 93 are in contact with material 10. Interposer member 84, however, has engaged associated interposer bar 154 (not shown) so that belt housing assembly 64 is prevented from being lowered and is swung outwardly from its normal position putting tension on its associated spring similar to spring 110 .

When solenoid 22 is de-energized, the belt housing assemblies are raised along with support member 20 to their original position. In the case of a restrained belt housing assembly, such as belt housing assembly 64, the associated spring similar to spring 110 will return the belt housing assembly in position against stop member 171.

When the ones of electromagnets 70 through 74 (i.e., electromagnet 74 in FIG. 1) are de-energized, the associated ones of interposer members 80 through 84 (i.e., interposer member 84 in FIG. 1) will return to their vertical position due to the action of springs 85, 86, 87, 88 and 89, respectively (only spring 85 being shown).

Ink supply means 30 will be described in greater detail hereinbelow, however, its basic operation is such that ink within a reservoir 160 may be selectively channeled through one or more individual valves 161 through 165 of which valve 161 is shown in FIG. 1. The valves 161 through 165 are respectively controlled by solenoids 166 through 170, of which solenoids 166, 167 and 168 are shown in FIG. 1. The ink channeled from reservoir 160 via valve 161 through 165 is applied to first ink transfer roller 40 by gravity action. The ink on transfer roller 40 is then transferred to one or more of the plurality of adjacent second ink transfer rollers such as roller 50 which in turn applies the ink to its associated belt such as belt 90. When solenoid 22 is actuated, the belts of the belt housing assemblies 60 through 64 which are not latched by the interposers 80 through 84 will be brought into contact with the material 10 and a printed strip will result.

Referring to FIG. 2, a side elevation, cross-sectional view of the structure of FIG. 1 is presented showing the marking apparatus in the print position and a belt housing assembly, for example, belt housing assembly 60, in the interposed or restrained position. For clarity the other belt housing assemblies and their associated interposer members have been omitted from FIG. 2.

In FIG. 2, it is seen that solenoid 22 has been actuated and support member 20 is lowered. Control electromagnet 70 has also been energized, causing interposer member 80 to swing in the path of and engage interposer bar 150. Thus, as support member 22 is lowered, belt housing assembly 60 is prevented from also being lowered by interposer member 80. The entire belt housing assembly 60 will instead rotate about shaft 100 and away from stop member 171 with which it is normally held in contact with by the action of spring 110. Belt 90 is thereby held above and is not in contact with material 10. The position of valve 161 of ink supply means 30 should be noted. Ink reservoir 160 contains a supply of ink and has a plurality of apertures 172, 173, 174, 175 and 176 such as aperture 172 in the base thereof. When each solenoid such as solenoid 166 is not energized, each associated slidable valve such as slidable valve 161 remains in its furthermost position. In the furthermost position a corresponding aperture in each valve such as aperture 180 in valve 161 is located directly below the associated aperture in the ink reservoir such as aperture 172 such that aperture 180 is filled with ink flowing by gravity from reservoir 160. The ink remains in aperture 180 since the end of aperture 180 is in contact with ink roller housing 190. Thus, when any of the solenoids 166 through 170 is not energized, no ink is applied to first ink transfer roller 40 at the points therebelow respective apertures 190 through 194 in ink roller housing 45.

In FIG. 2, since belt 90 is not brought into contact with material 10 for printing, it is not necessary that any ink be transferred onto ink roller 50 by valve 161, thus solenoid 166 is not energized and valve 156 remains in the furthermost position and no ink will be applied to ink roller 40 and consequently not to ink roller 50 or belt 90.

FIG. 3 depicts the marking apparatus in the print position showing belt housing assembly 60 in contact with

material 10 for printing a stripe thereon. Solenoid 22 is energized as in FIG. 2, however, electromagnet 70 is not energized and interposer member 80 remains in the vertical position out of the downward path of interposer bar 150. Spring 110 maintains belt housing assembly 60 in position against stop member 171 and pulley wheels 60*a* and 60*b* bring the portion of belt 90 therebetween into contact with material 10.

Since it is desired to print with belt 90 of belt housing assembly 60, solenoid 166, associated with the ink supply means 30 is energized, thereby positioning valve member 161 such that aperture 180 is positioned over aperture 190 in ink roller housing 45. With valve member 161 in such position, the ink contained in aperture 180 will flow through aperture 190 onto first ink transfer roller 40, from which it is transferred to roller 50 and onto belt 90. Belt 90 is being held downward against material 10 by the tension in spring 110 applied through pulley wheels 60*a* and 60*b*, and since material 10 is moving relative to the pulley wheels, the resulting friction will cause belt 90 to move about pulley wheels 60*a*, 60*b*, 60*c* and 60*d* and the ink will be transferred to material 10 in stripe form.

It was stated that an undesirable factor in the applying of coded stripes to moving surfaces is that high and low spots in the surface and the motion of the surface may cause bouncing of the printing members resulting in discontinuities in the printed stripes which cause errors when scanned. A feature of the present invention which overcomes this drawback is the use of a plurality of printing elements (i.e., pulley wheels) which bear against the moving surface with different degrees of tension. In FIG. 3 it is seen that belt 90 is coated with a quantity of ink from ink supply means 30 via ink rollers 40 and 50. As the material 10 moves from right to left relative to belt housing assembly 60 it causes belt 90 to move clockwise about pulley wheels 60*a*, 60*b*, 60*c* and 60*d*. Pulley wheels 60*a* and 60*b* press belt 90 against surface 10 at their tangential points of contact with a pressure proportional to the tension of spring 110. Were the application of the inked stripe on material 10 determined solely by either or both of pulley wheels 60*a* and 60*b* and spring 110, the discontinuities of the stripe due to low spots and bounce would still occur. The pressure applied to material 10 by pulley wheel 60*a*, however, is also proportional to the tension of spring 140 applied through lever arm 120. Thus, the pressure applied to material 10 by pulley wheel 60*b* is different than the pressure applied by pulley wheel 60*a*. By proper selection of the tension of springs 110 and 140 (determined by the speed of the material 10, the amount of low spots anticipated, etc.) it can be seen that the effect of low spots and bounce on pulley wheel 60*b* will be different than the effect on pulley wheel 60*a*. Thus, discontinuities in the printed stripe which are present after the material 10 passes under pulley wheel 60*b* will be filled in and corrected for by pulley wheel 60*a*. The use of a second pulley wheel (60*a*) within belt 90 under a different spring tension than pulley wheel 60*b* is sufficient to insure a continuous printed stripe in most instances, however, more than two pulley wheels may be employed for pressing belt 90 against material 10. For example, a second lever may be fixed to the belt housing assemblies with a third spring at one end differing in tension from both spring 110 and spring 140 with a further pulley wheel at the other end bearing belt 90 against material 10. The number of pulley wheels (on associated springs) for bringing belt 90 into contact with material 10 is therefore not limited to two as shown in FIGS. 1, 2 and 3.

Referring to FIG. 4, a plan view of the ink supply means 30 and other cooperative elements of the marking apparatus of FIG. 1 is shown. The ink reservoir 160 has a plurality of apertures 172, 173, 174, 175 and 176. It is noted that the number of apertures is equal to the number of ink rollers 50 through 54 and belt housing assemblies 60 through 64 and the apertures 172 through 176 are aligned therewith. Below the apertures 172 through 176 are slidable valves 161 through 165 which are respectively connected to separate ones of solenoids 166 through 170. Each slidable valve 161 through 165 respectively contains an aperture 180 through 184 which, when a valve is in its furthermost position such as valves 161, 163 and 165, is aligned below the associated apertures in ink reservoir 30 and when a valve is moved due to the energization of its associated one of solenoids 166 through 170, the associated one of apertures 180 through 184 is positioned above the associated one of apertures 190 through 194 in ink roller housing 145, as it is shown by valves 162 and 164.

The operation of the ink supply means 30 is as follows. Before a print signal is applied to solenoid 22 (FIG. 1) the solenoids 166 through 170 are not energized and slidable valves 161 through 165 are in their furthermost position. Thus, each of the apertures 180 through 184 becomes filled with ink which flows from ink reservoir 160 through apertures 172 through 176. When printing is to occur, that is, when solenoid 22 (FIG. 1) is energized, selected ones of electromagnets 70 through 74 are energized causing selected ones of belt housing assemblies 60 through 64 to be restrained by associated interposer members 80 through 84. In FIG. 4, electromagnets 70, 72 and 74 are shown energized and interposer members 80, 82 and 84 are restraining belt housing assemblies 60, 62 and 64. This means that no ink need be applied to belts 90, 92 and 94 and solenoids 166, 168 and 170 are not energized and slidable valves 161, 163 and 165 remain in the furthermost position. Belt housing assemblies 61 and 63 will not be latched by interposer members 81 and 83 and will be brought into contact with material 10 and therefore it is necessary that ink be applied to belts 91 and 93. Thus, solenoids 167 and 169 are energized and valves 162 and 164 are moved such that apertures 181 and 183 therein are positioned above apertures 191 and 193 in ink roller housing 145. The ink contained in apertures 181 and 183 flows through apertures 191 and 193 onto ink roller 40 which in turn transfers the ink to rollers 51 and 53 which apply the ink to belts 91 and 93. It is to be noted that the quantity of ink applied to the belts in each instance is predetermined and constant, being dependent on the dimensions of the apertures 180 through 184.

FIG. 5 shows, in block form, a typical means for controlling the marking apparatus of FIG. 1. It was stated that a print signal is necessary to energize solenoid 22, signals are necessary to energize the ones of control electromagnets 70 through 74 which are associated with the belt housing assemblies which will not be brought into contact with material 10, and signals are necessary to energize the ones of solenoids 166 through 170 of ink supply means 30 (FIG. 4) which are associated with the belt housing assemblies which will be brought into contact with material 10.

Referring to FIG. 5, a source of binary signals 200 is shown which has six output leads 201 through 206. Output lead 201 is connected directly to solenoid 22 such that when a "1" bit signal is present on lead 201, solenoid 22 is energized and support member 20 (FIG. 1) is lowered. Leads 202 through 206 are associated with solenoids 166 through 170 but are first connected directly to a gating circuit 207. Five leads 208 through 212 are respectively connected to leads 202 through 206 and then through inverter circuits 213 through 217 respectively to gating circuit 207. Gating circuit 207 is connected to lead 201 and is opened by the presence of a "1" bit signal thereon. The output leads 202 through 206 of gating circuit 207 are connected respectively to solenoids 166 through 170 and output leads 208 through

212 from gating circuit 207 are connected respectively to control electromagnets 70 through 74. A "1" bit signal on lead 202 from signal source 200 indicates that belt 90 of belt housing assembly 60 should be inked and brought into contact with material 10 (FIG. 1). Thus lead 202 is connected through gating circuit 207 to solenoid 166 which causes valve 161 to channel ink onto roller 40 (FIG. 4). The "1" bit signal on lead 202 is converted to a "0" bit signal on lead 208 by inverter circuit 213 so that control electrode 70 (connected to lead 208) is not energized and belt housing assembly 60 will not be interposed and will be brought into contact with material 10 (FIG. 1). Likewise a "1" bit signal on lead 203 will energize solenoid 167 (FIG. 4) and will be inverted to a "0" bit signal by inverter circuit 214 so that control electromagnet 71 connected to lead 209 will not be energized. In like manner "1" bit signals on leads 204, 205 and 206 will energize solenoids 168, 169 and 170 while at the same time electromagnets 72, 73 and 74 connected to leads 210, 211 and 212, respectively, will not be energized.

Conversely, a "0" bit on given ones of leads 202 through 206 will not energize corresponding solenoids 166 through 170, respectively, but by means of inverters 213 through 217 will respectively energize corresponding electromagnets 70 through 74 resulting in corresponding ones of belt housing assemblies 60 through 64 being interposed and the belts thereon not being inked.

Thus, to operate the marking apparatus of FIG. 1, the source of signals 200 in FIG. 5 will provide a "1" bit on lead 201 and "1" bits on given ones of leads 202 through 206 for whichever ones of belts 90 through 94 it is desired to have inked and brought into contact with material 10 (FIG. 1).

What has been described is a marking apparatus wherein selected ones or more of a plurality of belts may be inked and brought into contact with a moving surface for printing thereon one or more coded stripes. The marking apparatus includes an ink supply means wherein only the belts to be brought into contact with the moving surface are inked and wherein the amount of ink applied to the belts in each instance is a predetermined quantity as determined by the dimensions of apertures in slidable valves.

Also, each of the belts is brought into contact with the moving surface at two points by means of two pulley wheels. The pulley wheels impress the belt against the moving surface with two separate pressures so that discontinuities in the printed stripes due to one pulley wheel will be corrected for by the other pulley wheel. More than two pulley wheels may also be employed for this purpose.

The selection of the belts to be printed, the control of the ink supply means, and the lowering of the marking apparatus onto the print position is effected by simple electromagnets and solenoids which are in turn controlled by a source of binary signals. Thus the operation of the marking apparatus described may be completely controlled by a programmed computer.

While the invention has been particularly shown and described with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as set forth in the claims.

What is claimed is:

1. A marking apparatus for selectively applying coded indicia to a material surface comprising a plurality of separate marking elements,

means including an ink reservoir having a supply of ink therein for applying a predetermined quantity of ink to given ones of said marking elements,

means for bringing each of said given ones of said marking elements into contact with said material surface with at least two different contact pressures for transferring said predetermined quantity of ink thereon to said surface,

an ink roller system in contact with said plurality of separate marking elements,

a plurality of movable members disposed between said ink reservoir and said ink roller system,

and means for selectively moving said movable members for transporting predetermined quantities of ink to said ink roller system.

2. A marking apparatus according to claim 1 wherein said ink reservoir includes a first plurality of apertures in the bottom thereof,

wherein each of said plurality of movable members includes a hollow chamber therein located beneath a separate one of said first plurality of apertures when said movable members are in a first position such that a portion of ink in said ink reservoir fill said hollow chambers in said movable members,

wherein said ink roller system includes a member disposed beneath said movable members and having a second plurality of apertures therein located such that the ink contained in said chambers flows through a separate one of said second plurality of apertures when each of said movable members is selectively moved to a second position,

and a plurality of ink rollers located beneath said apertured member of said ink roller system and in contact with said plurality of separate marking elements for transferring the ink flowing through each of said second plurality of apertures to a separate one of said marking elements.

3. A marking apparatus for selectively applying coded indicia to the surface of a moving material comprising a plurality of separate marking elements suspended above the surface of said moving material on a common frame, each of said marking elements including a housing, a plurality of wheels rotatably mounted on said housing, and a continuous belt disposed about said plurality of wheels,

a plurality of interposer members, each mounted on said common frame proximate to a separate one of said marking elements,

a separate control means associated with each of said interposer means for selectively moving each of said interposer means to engage a separate one of said marking elements,

means for applying a predetermined quantity of ink to the belts of selected ones of said marking elements, said selected ones of said marking elements being those not engaged by associated interposer means,

a first plurality of springs, each connecting a separate one of said marking element housings to said common frame,

a second plurality of springs, each connecting a given one of said marking element wheels to said marking element housing,

means for moving said plurality of marking elements in a downward direction toward said moving material such that those marking elements not engaged by said associated interposer means come in contact with said moving material and the ink on the belts thereof is transferred to said moving material.

4. A marking apparatus according to claim 3 wherein each of said marking elements are brought into contact with said moving material with at least two different contact pressures, one of said contact pressures being applied by one of said rotatably mounted wheels and one of said first plurality of springs and a second of said contact pressures being applied by one of said second plurality of springs and said given one of said wheels connected thereto.

5. A marking apparatus for selectively applying stripes of ink at predetermined positions on the surface of a moving material comprising a support frame,

a movable frame connected to said support frame,

a plurality of separate marking elements rotatably mounted parallel to each other on said movable frame, said movable frame being suspended from said support frame above said surface of said moving material,

each of said marking elements including a housing, a plurality of rotatable wheels mounted on said housing, one of said wheels in each housing being pivotably mounted thereon, and a continuous belt disposed about said plurality of wheels,

a plurality of movable interposer members mounted parallel to each other on said support frame, each one of said interposer members being proximate to a separate one of said marking elements,

a first plurality of control means, each connected to a separate one of said interposer members for individually moving said interposer members to a position for engaging said marking elements,

a first plurality of springs, each connecting a separate one of said marking element housings to said movable frame,

a second plurality of springs, each connecting said pivotably mounted one of said marking element wheels in each marking element housing to said associated marking element housing,

an ink reservoir having a supply of ink therein mounted on said movable frame, said ink reservoir having a plurality of parallel apertures in the bottom thereof, said plurality of apertures being equal in number to said marking elements and said interposer members,

a plurality of movable members mounted beneath said ink reservoir, each movable member being associated with a separate one of said apertures in said ink reservoir and each of said movable members having an orifice therein aligned with said apertures in said ink reservoir when said movable members are in a first position such that a predetermined quantity of ink from said ink reservoir flows into said orifice,

an ink roller housing mounted on said movable frame beneath said movable members to prevent said ink in said orifices from flowing out of said orifices when said movable members are in said first position, said ink roller housing having a plurality of apertures therein offset from said orifices in said movable members when said movable members are in said first position,

a system of ink rollers mounted in said ink roller housing and in contact with said belts of said plurality of marking elements,

a second plurality of control means, each connected to a separate one of said movable members for selectively moving said movable members to a second position wherein the orifices therein are aligned above said apertures in said ink roller housing such that the ink contained in said orifice flows onto said system of ink rollers and onto said associated belts of said marking elements,

a separate control means for lowering said movable frame downward toward said surface of said moving material such that each of said pivotably mounted wheels of said marking elements press the belt thereof against said surface of said moving material with a first pressure determined by associated ones of said first and second plurality of springs, and at least a second one of said wheels in said marking elements press the belt thereof against said surface of said moving material with a second pressure determined by an associated one of said first plurality of springs,

and a control system connected to said first plurality of control means, said second plurality of control means and said separate control means for energizing said separate control means to lower said movable frame, for energizing selected ones of said first plurality of control means to cause associated ones of said interposer members to engage associated ones of said marking elements thereby preventing said engaged marking elements from being lowered, and for energizing selected ones of said second plurality of control means for moving the associated ones of said movable members to transfer the ink in the orifices thereof to said system of ink rollers and onto said associated belts of said marking elements not being engaged by said interposer member, said ink on said associated belts being transferred onto said surface of said moving material in the form of a stripe when said associated belts are brought into contact therewith by the aforesaid marking element wheels.

References Cited by the Examiner

UNITED STATES PATENTS

1,640,776	8/1927	Kuhlhoff	15—103.5
1,738,738	12/1929	Southey	15—103.5
2,610,934	9/1952	Steele	118—221 X

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